

From: Roddy, Elizabeth A CIV USN NAVFAC SW SAN CA (USA) [elizabeth.rodny@navy.mil]
Sent: Monday, April 26, 2021 4:46 PM
To: Praskins, Wayne [Praskins.Wayne@epa.gov]; Juanita.bacey@dtsc.ca.gov; Han, Terry (Terry.Han@cdph.ca.gov) [Terry.Han@cdph.ca.gov]
CC: Stoick, Paul T CIV USN NAVFAC SW SAN CA (USA) [paul.stoick@navy.mil]; Robinson, Derek J CIV USN NAVFAC SW SAN CA (USA) [derek.j.robinson1@navy.mil]; Liscio, Matthew P CIV USN NAVSEA DET RASO VA (USA) [matthew.liscio@navy.mil]
Subject: N62473-17-D-0006 CTO: N6247318F5065 Parcel G - Soil Data Package
Attachments: CTO5065_RSY29Use1_DataPackageRev2_04162021.pdf;
 CTO5065_RSY15Use2_DataPackageRev1_04092020.pdf;
 CTO5065_RSY20Use3_DataPackageRev1_04202021.pdf

Dear Wayne, Nina and Terry,

Following our discussion on Tuesday the 20th and to support the agencies oversight/split sampling effort and as a curtesy of information sharing, attached you will find the revised Soil Data Package's for Parcel G Phase 1 clarifying a case narrative note on homogenization of samples. This revised note is identical throughout the reports, with respect to the appropriate sample ID's, and can be found on page 4 of the Eurofins Analytical Report, Case Narrative, under section Total Beta Strontium (GFPC). In summary the note was revised to:

“When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc.) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP.”

The following reports were revised. Those highlighted below are attached to this email.

	Soil Data Package	Corresponding TU or SU	Final Report Submitted to Agencies	Revised Report Submitted to Agencies
1	RSY18Use1	TU-098B ESU	12/3/2020	4/26/2021
2	RSY20Use2	TU-098C ESU	12/14/2020	4/26/2021
3	RSY29Use2	SU-28B	1/5/2021	4/26/2021
4	RSY20Use3	TU-098D ESU	1/5/2021	4/26/2021
5	RSY29Use1	SU-28A	2/2/2021	4/26/2021
6	RSY15Use2	TU-098B SFU	2/2/2021	4/26/2021
7	RSY12Use1	TU-099A SFU	2/2/2021	4/26/2021
8	RSY31Use2	TU-153B SFU	2/2/2021	4/26/2021
9	RSY1Use1	TU-077A ESU	1/26/2021	4/26/2021
10	RSY11Use1	TU-099A ESU	1/26/2021	4/26/2021
11	RSY1Use2	TU-077B ESU	1/26/2021	4/26/2021

Please let me know if you have any questions.

Very Respectfully,

Liz Roddy
Remedial Project Manager
NAVFAC BRAC PMO West
33000 Nixie Way
Bldg. 50, Floor 2
San Diego, CA 92147
(619) 524-5755
elizabeth.rodny@navy.mil

Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 15 Use 2	Soil Origin: TU-098B SFU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/04/2021

Systematic Soil Sample Data: RSY 15 Use 2							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-SFU-TU098B-001	1	Systematic	11,662	15,658	0.346	-0.0671	-0.0367
HPPG-SFU-TU098B-002	2	Systematic	12,334	15,658	0.321	-0.0356	N/A
HPPG-SFU-TU098B-003	3	Systematic	12,135	15,658	0.108	0.0262	N/A
HPPG-SFU-TU098B-004	4	Systematic	12,192	15,658	0.329	0.0154	N/A
HPPG-SFU-TU098B-005	5	Systematic	12,220	15,658	0.0968	0.0250	N/A
HPPG-SFU-TU098B-006	6	Systematic	12,400	15,658	0.253	0.00474	N/A
HPPG-SFU-TU098B-007	7	Systematic	12,498	15,658	0.406	0.0229	N/A
HPPG-SFU-TU098B-008	8	Systematic	12,709	15,658	0.357	-0.0349	N/A
HPPG-SFU-TU098B-009	9	Systematic	13,016	15,658	0.307	0.00195	N/A
HPPG-SFU-TU098B-010	10	Systematic	12,751	15,658	0.680	0.109	N/A
HPPG-SFU-TU098B-011	11	Systematic	12,606	15,658	0.370	0.0226	0.0517
HPPG-SFU-TU098B-012	12	Systematic	12,374	15,658	0.490	0.000	N/A
HPPG-SFU-TU098B-013	13	Systematic	12,749	15,658	0.310	-0.0346	N/A
HPPG-SFU-TU098B-014	14	Systematic	12,544	15,658	0.453	0.00265	N/A
HPPG-SFU-TU098B-015	15	Systematic	13,036	15,658	0.352	-0.00846	N/A
HPPG-SFU-TU098B-016	16	Systematic	12,990	15,658	0.284	0.0134	N/A
HPPG-SFU-TU098B-017	17	Systematic	12,187	15,658	0.366	0.0169	N/A
HPPG-SFU-TU098B-018	18	Systematic	12,165	15,658	0.426	0.0182	N/A
HPPG-SFU-TU098B-019	19	Systematic	12,442	15,658	0.413	-0.000545	N/A
HPPG-SFU-TU098B-020	20	Systematic	13,035	15,658	0.0411	-0.0490	N/A
HPPG-SFU-TU098B-021	21	Systematic	12,584	15,658	0.417	0.0113	0.00492
HPPG-SFU-TU098B-022	22	Systematic	12,862	15,658	0.255	-0.0306	N/A
HPPG-SFU-TU098B-023	23	Systematic	12,909	15,658	0.260	0.00244	N/A
HPPG-SFU-TU098B-024	24	Systematic	10,808	15,658	0.376	0.00159	N/A
HPPG-SFU-TU098B-025	25	Systematic	13,094	15,658	0.422	-0.0247	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)
Maximum					0.680	0.109	0.0517
Mean					0.3376	0.0004	0.0066
Median					0.352	0.0024	0.0049
Minimum					0.0411	-0.0671	-0.0367
Standard Deviation					0.1312	0.0339	N/A

Biased Soil Sample Data: RSY 15 Use 2							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-SFU-TU098B-B-001	1	Biased	11,931	15,658	0.550	0.00289	-0.0194

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10292020-PG-ROV-255	10/29/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10292020-PG-JSS-257	10/29/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10292020-PG-JSS-251	10/29/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10302020-PG-JSS-259	10/30/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 15 Lift 2
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 25 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 25 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-38. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 39-73). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 39-73). Samples HPPG-F-025 and HPPG-F-026 are field duplicates, correlating to systematic samples -011 and -025. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 74-88). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 15 Lift 2 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-098B SFU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-098.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-15-U2				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	6.01	36.09	18.60	18.04	4.36
ROI-06	71.15	154.35	110.85	110.28	11.96
ROI-07	54.11	116.26	83.11	83.18	10.00
ROI-08	95.20	184.37	138.42	138.33	12.97
ROI-10	2,461.33	3,093.70	2,824.11	2,844.88	117.37

Statistical Summary Reference Background

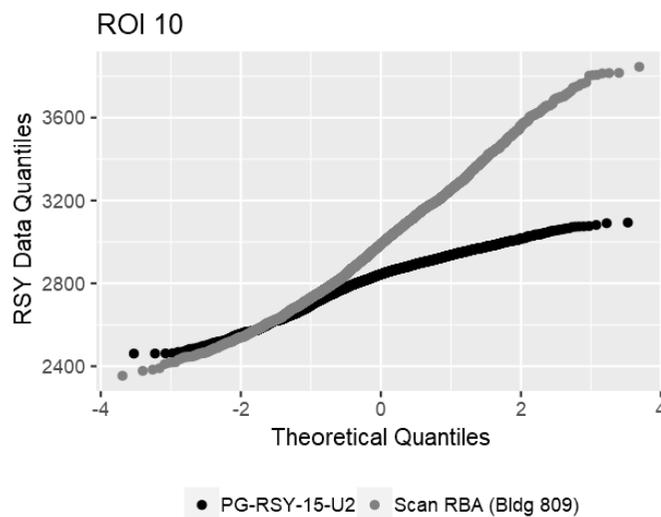
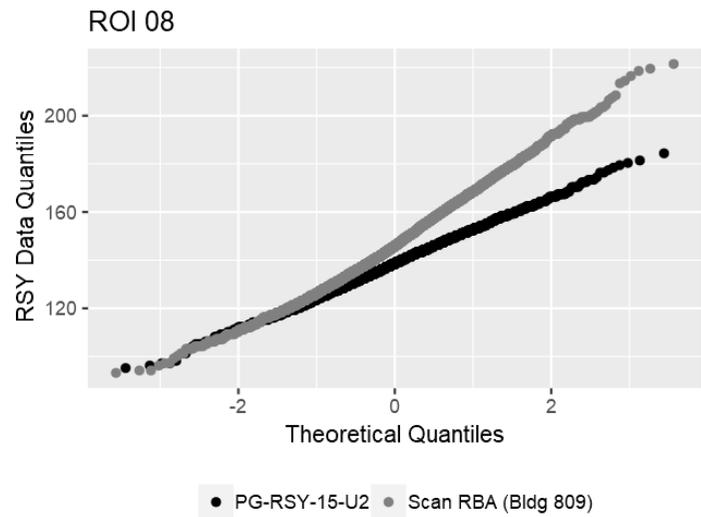
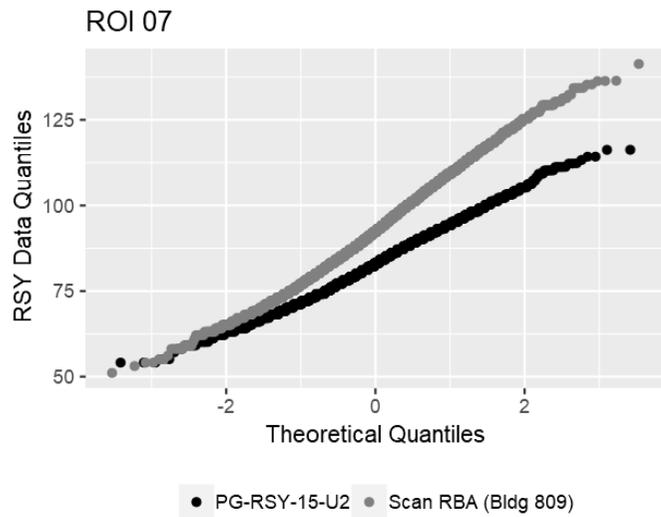
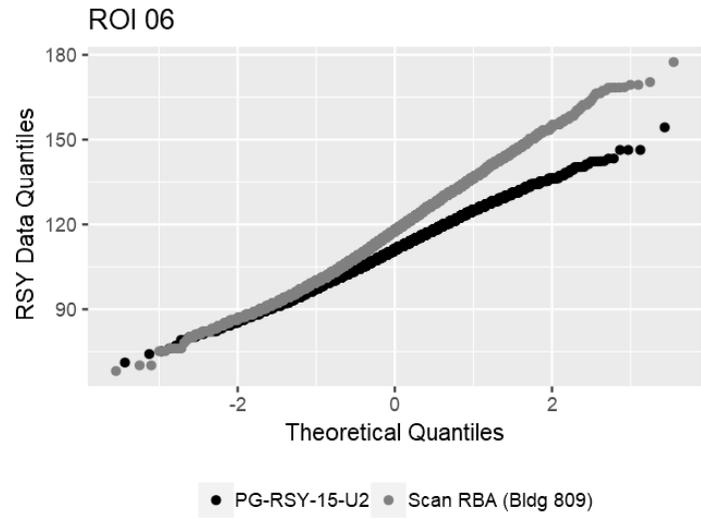
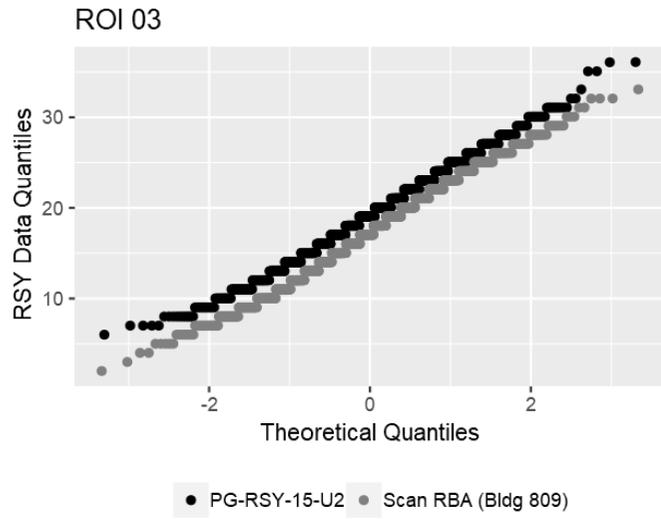
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-15-U2	2479
Scan RBA (Bldg 809)	4632

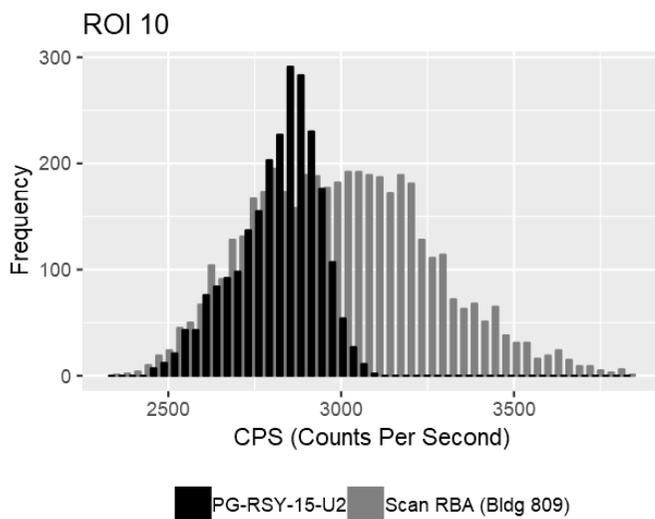
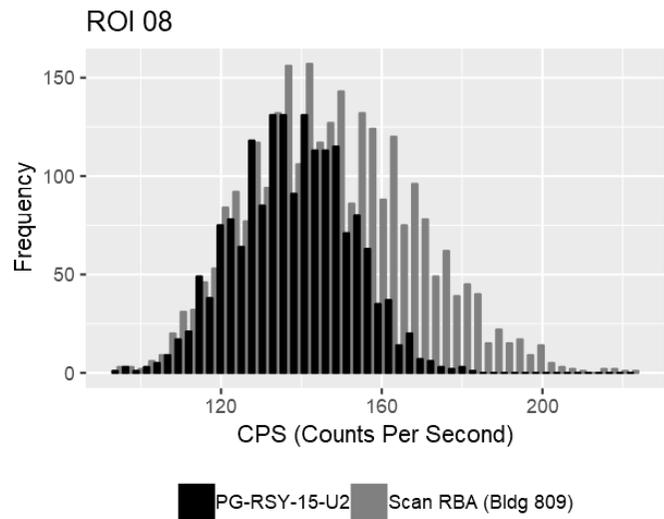
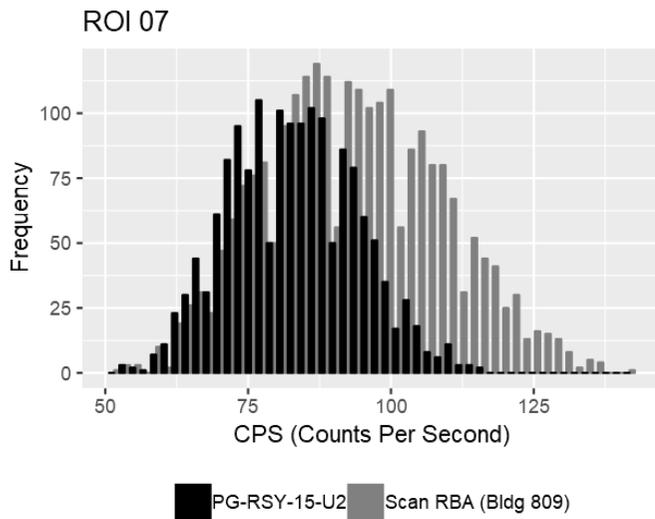
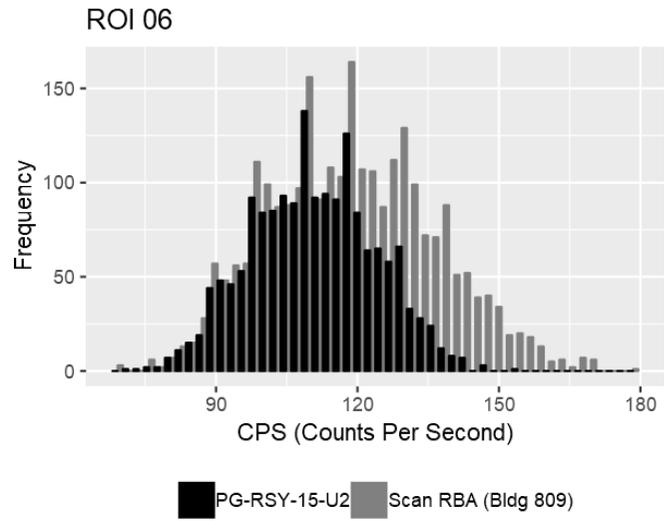
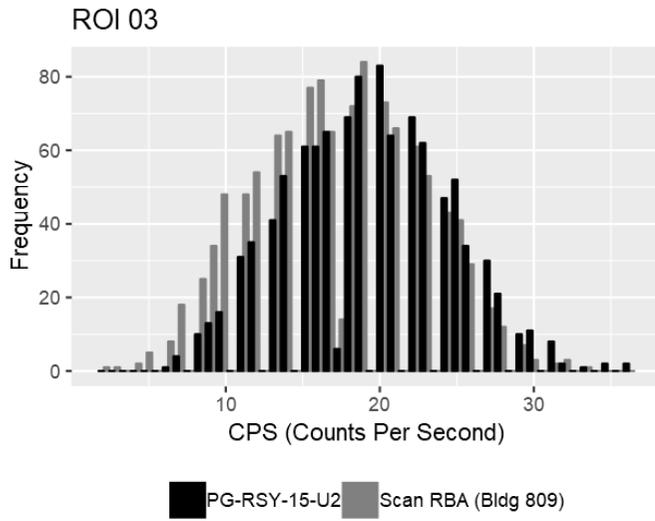
Soil Scan Statistics

Normal Q-Q Plots



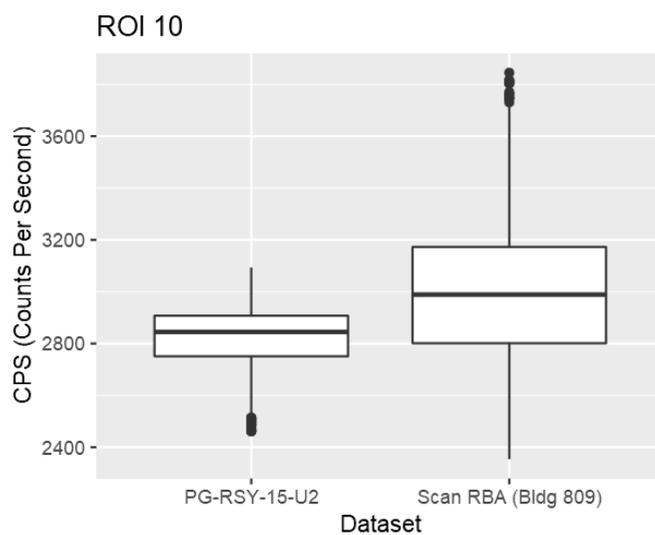
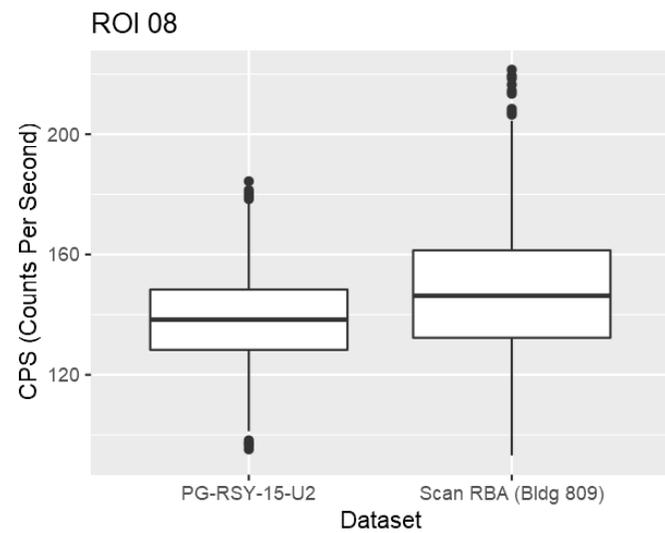
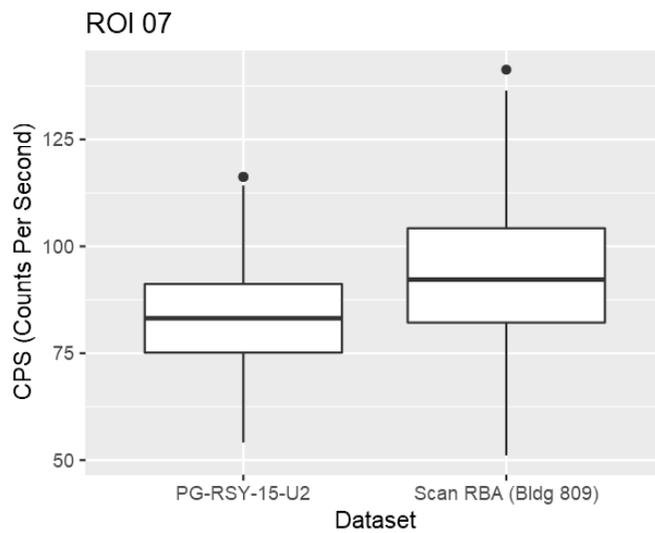
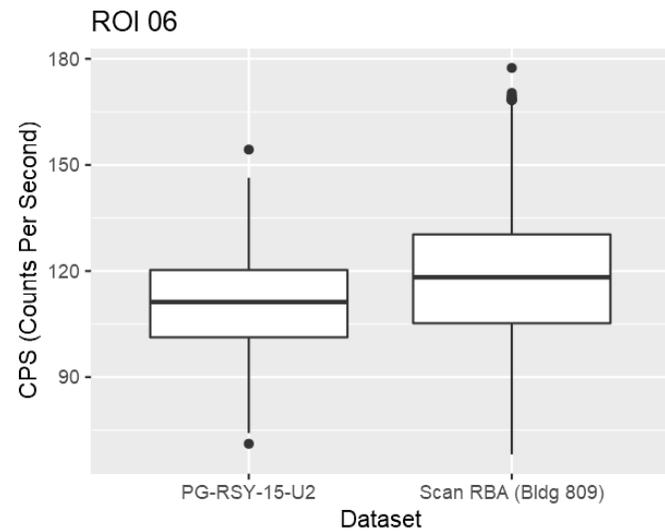
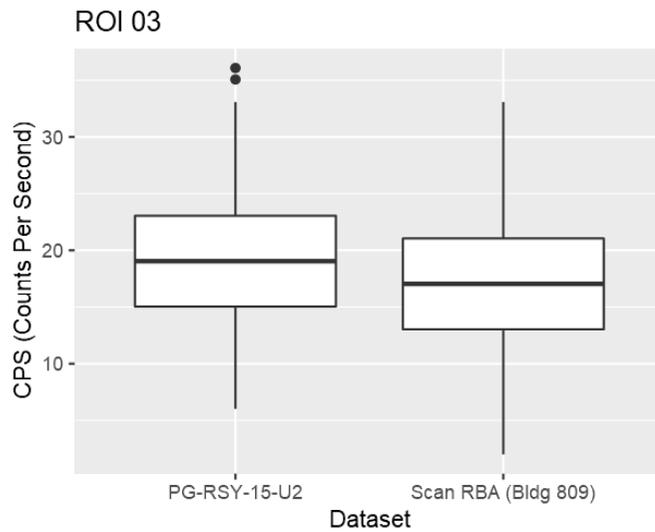
Soil Scan Statistics

Histograms



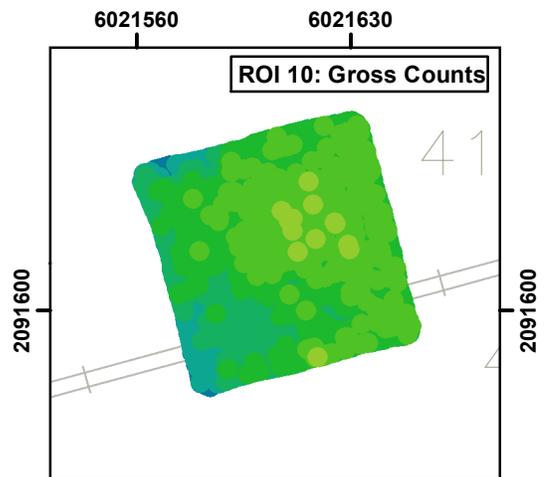
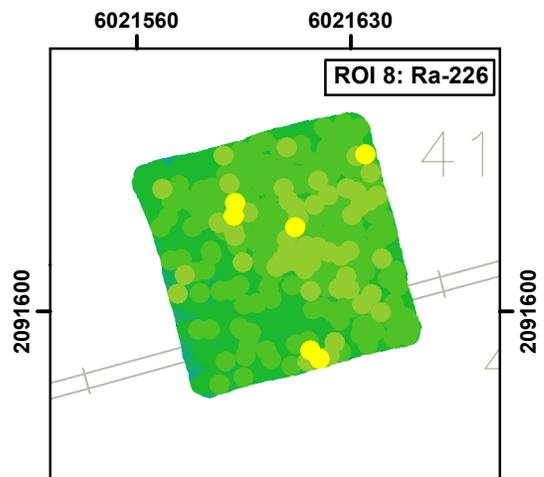
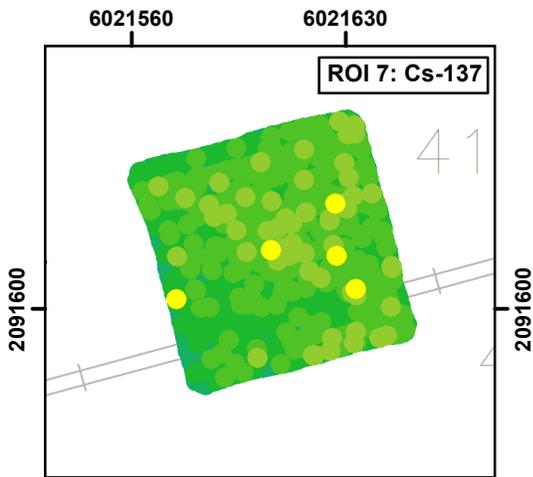
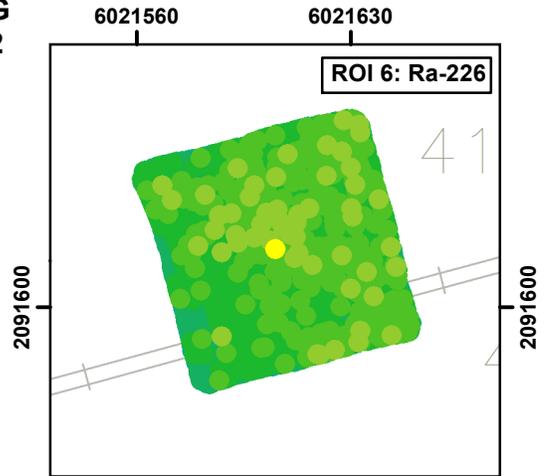
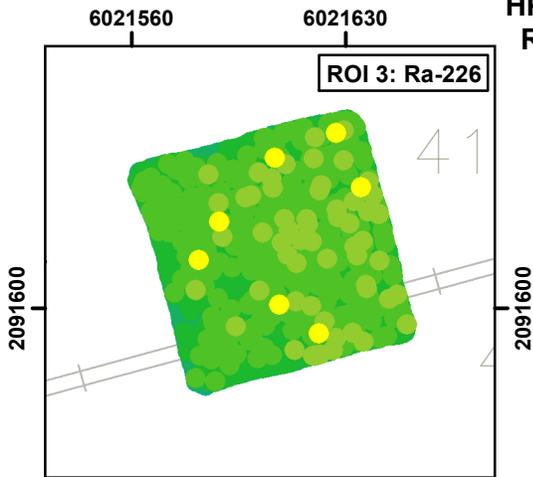
Soil Scan Statistics

Box Plots



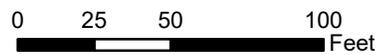
**RSI Data Plots
HPNS Parcel G
RSY 15 Use 2**

TU-098B SFU



RS 700 Gamma Walkover Survey Data (VD1)

- | | |
|--|--|
| ● > 3 std dev | ● > -1 to < 0 std dev |
| ● > 2 to < 3 std dev | ● > -2 to < -1 std dev |
| ● > 1 to < 2 std dev | ● > -3 to < -2 std dev |
| ● > 0 to < 1 std dev | ● < -3 std dev |

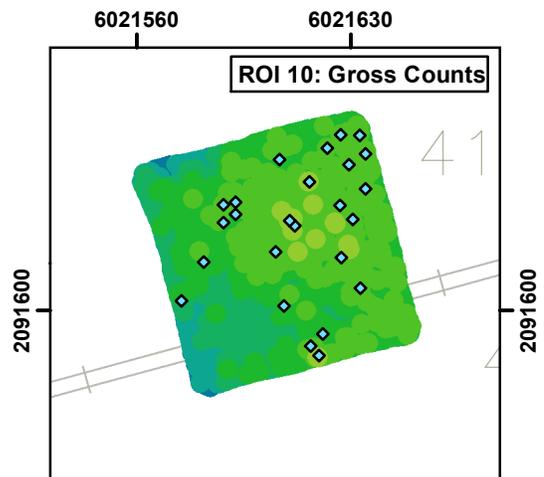
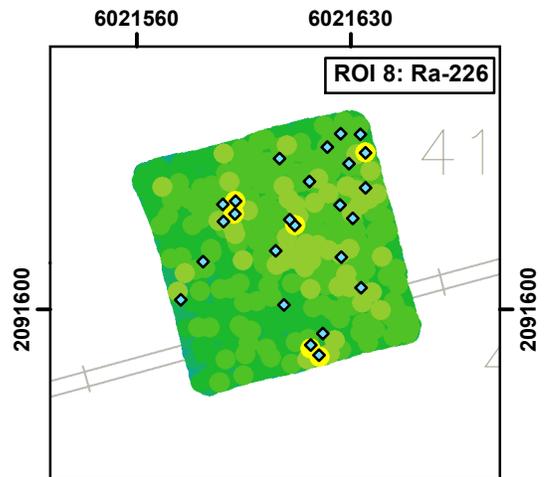
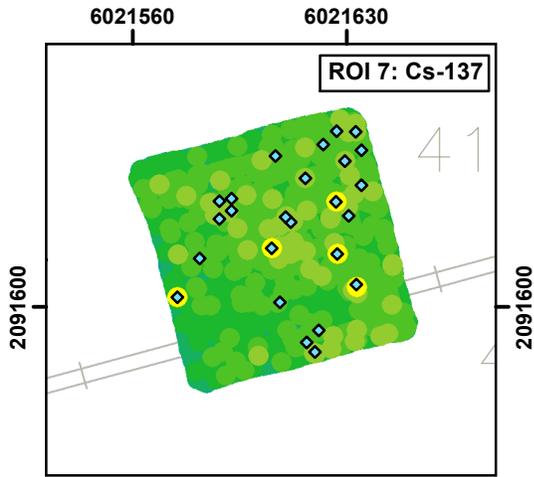
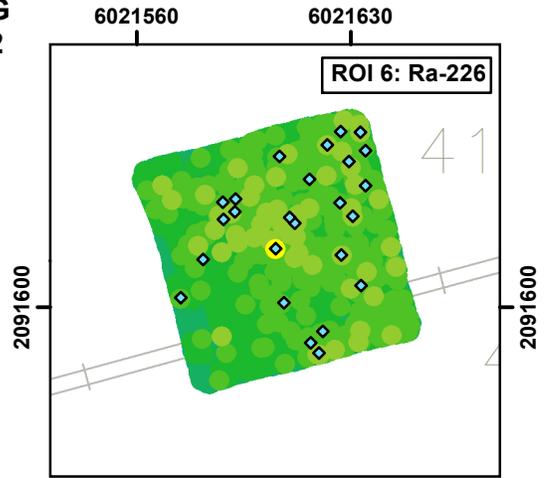
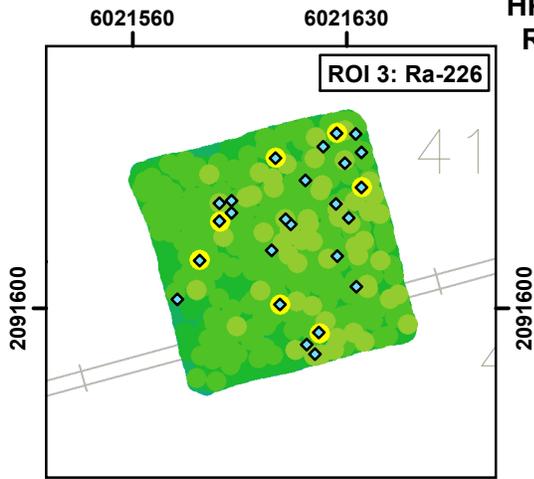


Coordinate system: CSP Zone III, NAD83, US Survey Foot



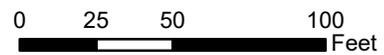
**RSI Data Plots
HPNS Parcel G
RSY 15 Use 2**

TU-098B SFU



RS 700 Gamma Walkover Survey Data (VD1)

- ◆ Follow-Up Location
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

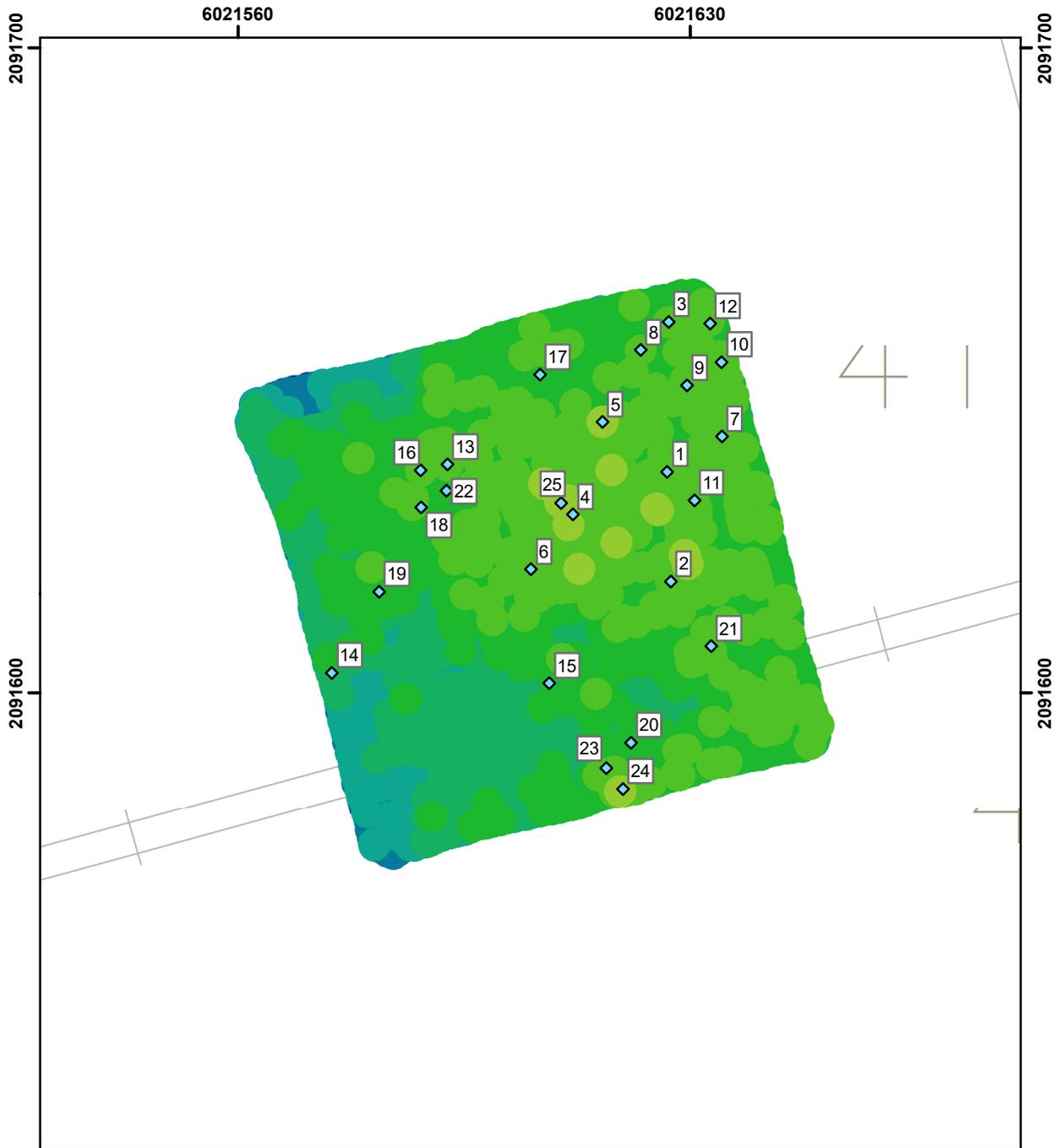


Coordinate system: CSP Zone III, NAD83, US Survey Foot



**Follow-Up Static Survey
HPNS Parcel G
RSY 15 Use 2**

TU-098B SFU



RSY 15 Use 2 (VD1, ROI 10 Gross Gamma)

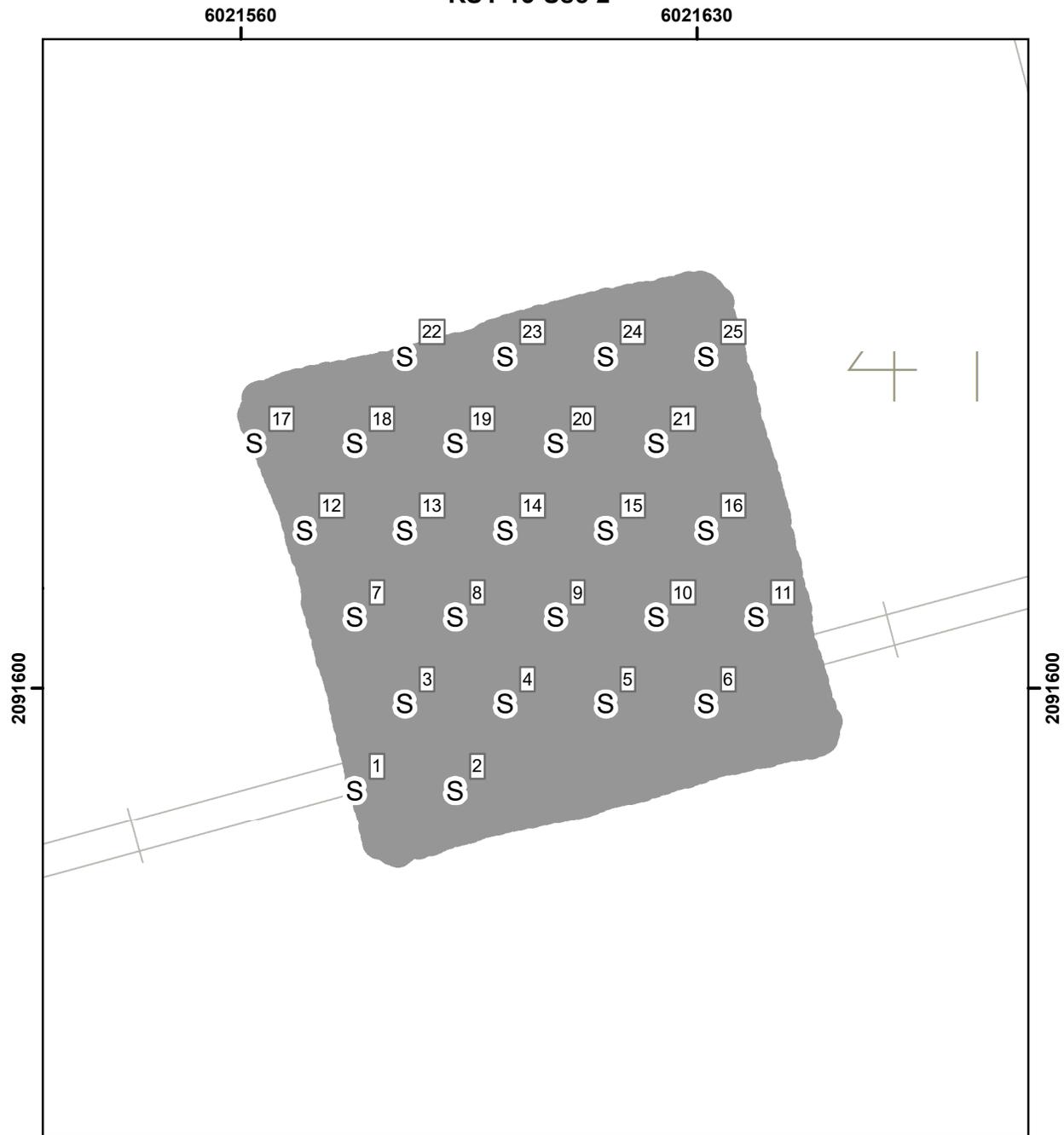
◆ Follow-Up Location	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

Systematic Sampling HPNS Parcel G RSY 15 Use 2

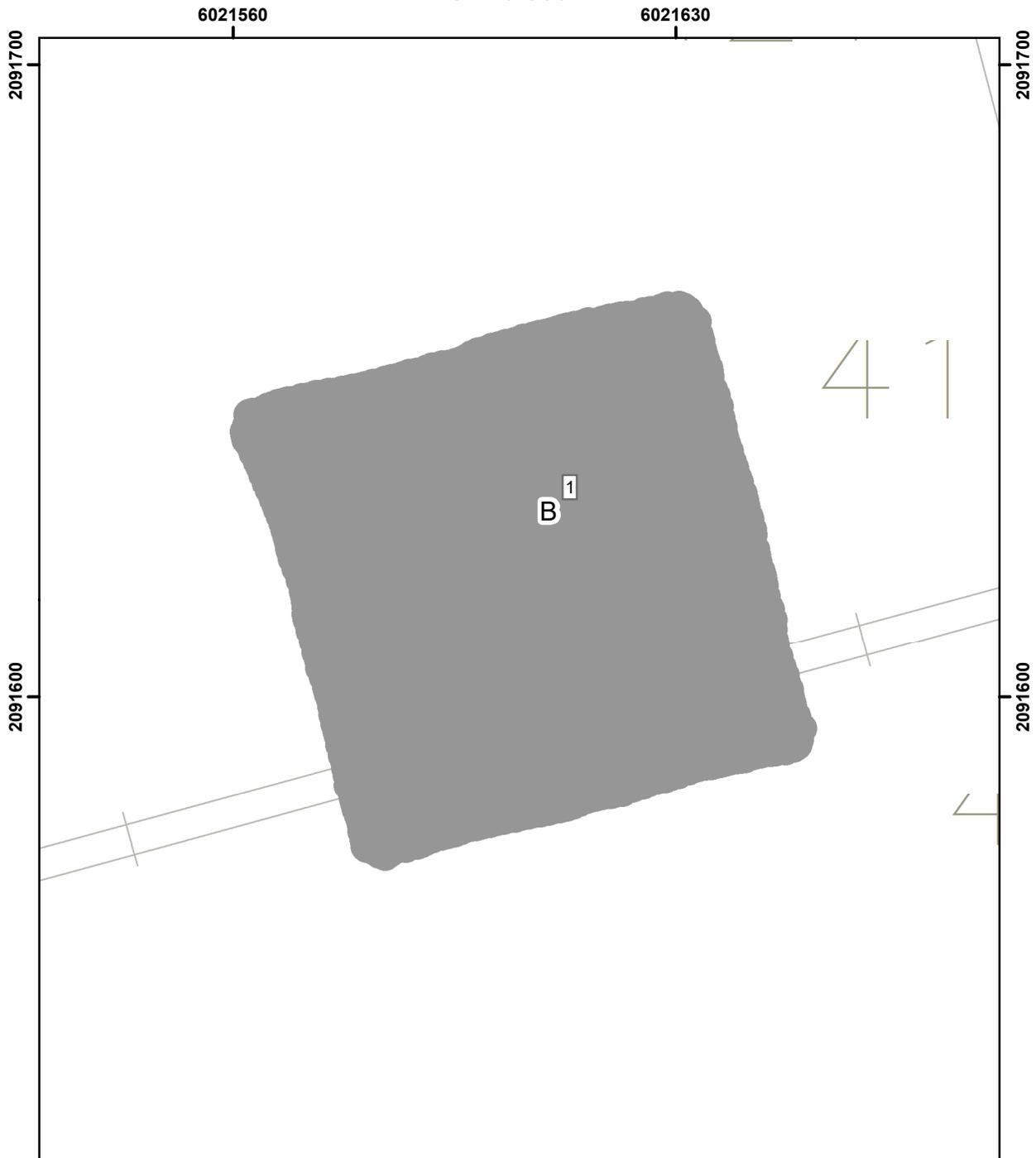
TU-098B SFU



<p>RSY 15 Use 2</p> <ul style="list-style-type: none"> Systematic Sample Locations RS-700 GWS Coverage	<p>0 10 20 40 Feet</p> <p>Coordinate system: CSP Zone III, NAD83, US Survey Foot</p> 
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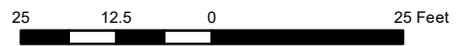
**Biased Sampling
HPNS Parcel G
RSY 15 Use 2**

TU-098B SFU



RSY 15 Use 2

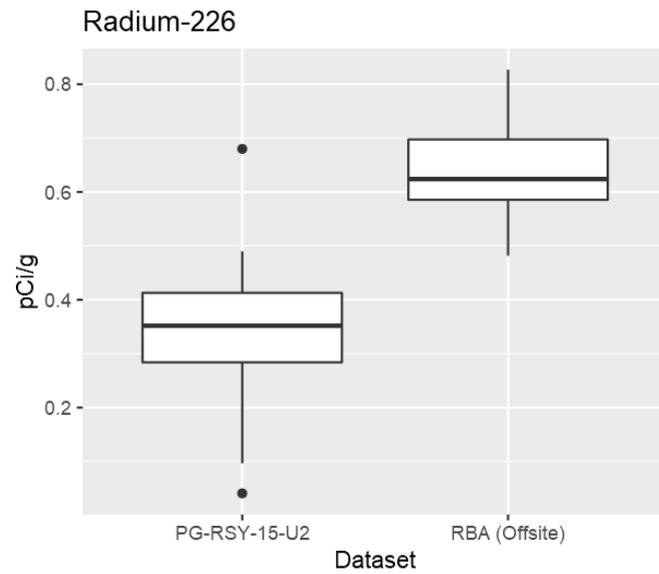
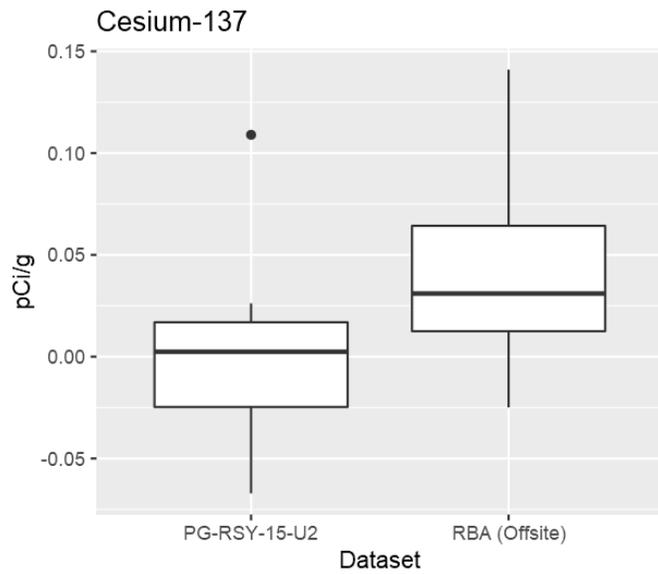
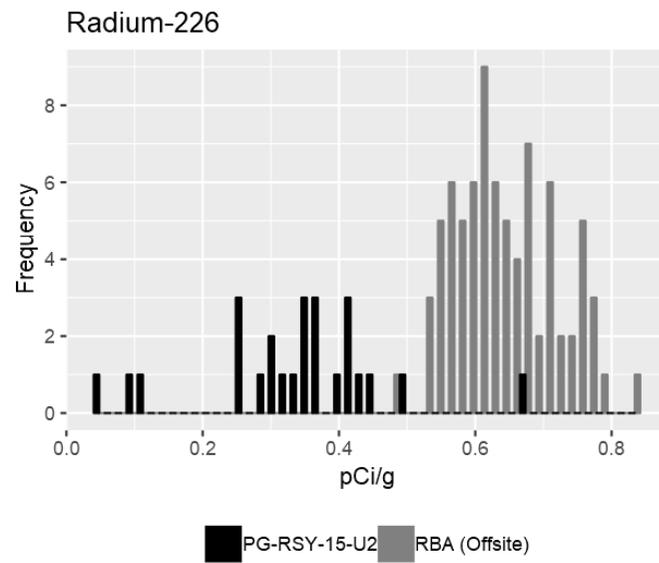
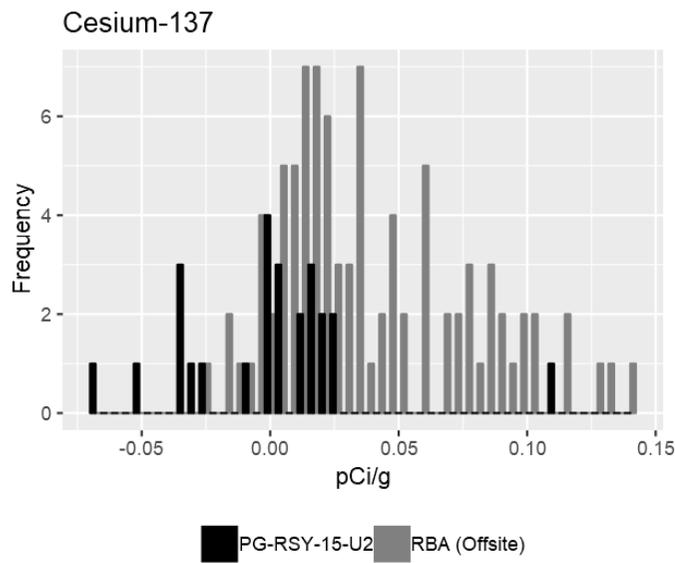
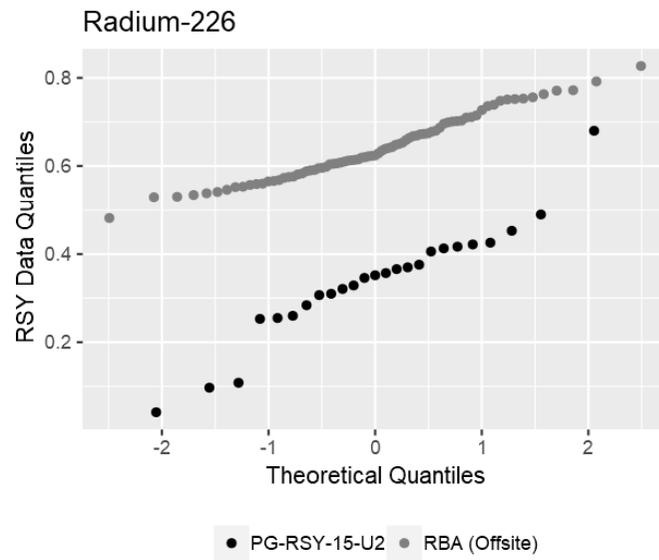
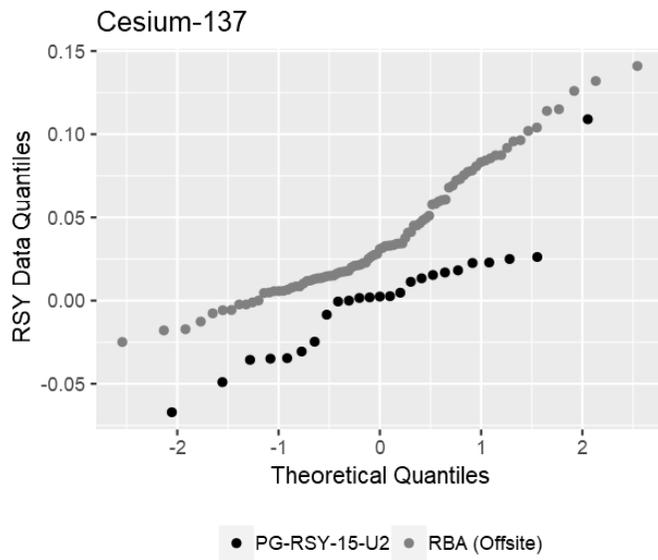
- B** Biased Sample Location
- RS-700 GWS Coverage



Coordinate system: CSP Zone III, NAD83, US Survey Foot



Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: **Rs-226** Location: **RSY 15 Use 2**
 LBGR: **0.352** pCi/g

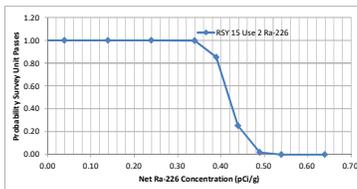
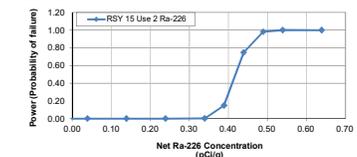
DOGL: **1**
 LBGR = **Median SU Data**
 LBGR = **0.352**

DATA	AREA	ADJUSTED DATA	RANKS	SURVEY UNIT	Sorted Ranks	Location Associated with Sorted Rank
0.59	R	0.588	48.5	0	1	S
0.69	R	0.687	101	0	2	S
0.57	R	0.566	40	0	3	S
0.64	R	0.635	78.5	0	4	S
0.61	R	0.606	59	0	5	S
0.65	R	0.653	87.5	0	6	S
0.61	R	0.613	62	0	7	S
0.71	R	0.711	109	0	8	S
0.68	R	0.68	99.5	0	9	S
0.61	R	0.608	59	0	10	S
0.54	R	0.541	31	0	11	S
0.59	R	0.588	48.5	0	12	S
0.67	R	0.673	96	0	13	S
0.67	R	0.674	97	0	14	S
0.48	R	0.482	26	0	15	S
0.76	R	0.763	121	0	16	S
0.75	R	0.748	115	0	17	S
0.56	R	0.56	37.5	0	18	S
0.61	R	0.614	64	0	19	S
0.53	R	0.529	27	0	20	S
0.61	R	0.605	57	0	21	S
0.58	R	0.575	44	0	22	S
0.67	R	0.672	95	0	23	S
0.56	R	0.559	38	0	24	S
0.68	R	0.664	90.5	0	25	S
0.55	R	0.546	32	0	26	R
0.74	R	0.739	114	0	27	R
0.74	R	0.736	113	0	28	R
0.60	R	0.604	56	0	29	R
0.70	R	0.701	105	0	30	R
0.59	R	0.589	104	0	31	R
0.70	R	0.699	104	0	32	R
0.62	R	0.624	73.5	0	33	R
0.58	R	0.583	43	0	34	R
0.57	R	0.573	43	0	35	R
0.62	R	0.623	71	0	36	R
0.60	R	0.598	58	0	37.5	R
0.64	R	0.643	84	0	37.5	R
0.55	R	0.553	34	0	39	R
0.75	R	0.751	116.5	0	40	R
0.77	R	0.771	122	0	41.5	R
0.72	R	0.715	110.5	0	41.5	R
0.62	R	0.62	68	0	43	R
0.71	R	0.71	108	0	44	R
0.58	R	0.581	46	0	45	R
0.60	R	0.595	53	0	46	R
0.58	R	0.58	37.5	0	47	R
0.75	R	0.751	116.5	0	48.5	R
0.67	R	0.669	93.5	0	48.5	R
0.62	R	0.619	67.5	0	49.5	R
0.64	R	0.641	82.5	0	50.5	R
0.59	R	0.589	104	0	52	R
0.61	R	0.614	64	0	53	R
0.65	R	0.653	87.5	0	54	R
0.58	R	0.576	45	0	55	R
0.62	R	0.622	69.5	0	56	R
0.57	R	0.565	39	0	57	R
0.63	R	0.629	76.5	0	58	R
0.64	R	0.641	82.5	0	59	R
0.61	R	0.614	64	0	60	R
0.66	R	0.664	90.5	0	61	R
0.77	R	0.772	123	0	62	R
0.64	R	0.639	80.5	0	64	R
0.62	R	0.624	73.5	0	64	R
0.61	R	0.612	61	0	64	R
0.65	R	0.648	85	0	66	R
0.55	R	0.552	33	0	67	R
0.62	R	0.624	73.5	0	68	R
0.62	R	0.616	69.5	0	69.5	R
0.64	R	0.635	78.5	0	69.5	R
0.70	R	0.703	107	0	71	R
0.53	R	0.53	28.5	0	73.5	R
0.73	R	0.727	112	0	73.5	R
0.62	R	0.624	73.5	0	73.5	R
0.65	R	0.65	80.5	0	75	R
0.67	R	0.668	92	0	76.5	R
0.54	R	0.538	30	0	76.5	R
0.57	R	0.568	41.5	0	76.5	R
0.60	R	0.596	54	0	76.5	R
0.59	R	0.591	52	0	80.5	R
0.68	R	0.678	98	0	80.5	R
0.67	R	0.669	93.5	0	82.5	R
0.79	R	0.792	124	0	82.5	R
0.75	R	0.752	118	0	84	R
0.56	R	0.557	35	0	85	R
0.62	R	0.622	69.5	0	86	R
0.70	R	0.702	106	0	87.5	R
0.64	R	0.639	80.5	0	87.5	R
0.76	R	0.756	120	0	89	R
0.70	R	0.696	102.5	0	90.5	R
0.72	R	0.715	110.5	0	90.5	R
0.66	R	0.659	89	0	92	R
0.70	R	0.696	102.5	0	93.5	R
0.63	R	0.629	76.5	0	93.5	R
0.68	R	0.68	99.5	0	95	R
0.53	R	0.534	29	0	96	R
0.61	R	0.61	60	0	97	R
0.83	R	0.827	125	0	98	R
0.75	R	0.753	119	0	99.5	R
0.57	R	0.568	41.5	0	99.5	R
0.346	S	-0.006	12	12	101	R
0.281	S	-0.031	10	10	102.5	R
0.108	S	-0.244	3	3	102.5	R
0.399	S	-0.023	11	11	104	R
0.098	S	-0.2552	2	2	105	R
0.253	S	-0.099	4	4	106	R
0.406	S	0.054	18	18	107	R
0.387	S	0.005	14	14	108	R
0.307	S	-0.045	8	8	109	R
0.68	S	0.328	25	25	110.5	R
0.37	S	0.018	16	16	110.5	R
0.46	S	0.138	24	24	112	R
0.31	S	-0.042	9	9	113	R
0.453	S	0.101	23	23	114	R
0.382	S	0	13	13	115	R
0.284	S	-0.068	7	7	116.5	R
0.396	S	0.014	15	15	116.5	R
0.425	S	0.074	22	22	118	R
0.413	S	0.061	19	19	119	R
0.9411	S	-0.3109	1	1	120	R
0.417	S	0.065	20	20	121	R
0.255	S	-0.097	5	5	122	R
0.26	S	-0.092	6	6	123	R
0.373	S	0.024	17	17	124	R
0.422	S	0.07	21	21	125	R
		Sum =	7876	325	7875	

POWER CURVE CALCULATION

Concentration	above Background (C)	(C-LBGR)	SD	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power	Probability of passing
0.7	-0.16	-3.9	0.00234	0.00017	5.8475	57.69651	7.593189	213.416	0.00	1.00	
0.75	-0.11	-3.5	0.00666	0.00074	16.66	229.8262	15.16009	106.18	0.00	1.00	
0.8	-0.06	-3.1	0.01695	0.00269	42.3675	760.5102	27.93761	56.6973	0.00	1.00	
0.9	0.04	-2.4	0.03855	0.00847	96.375	2238.671	47.31459	32.3363	0.00	1.00	
1	0.14	-1.6	0.12895	0.04650	322.375	9466.721	97.29707	13.402	0.00	1.00	
1.1	0.24	-0.9	0.25226	0.12892	655.648	18976.81	137.7564	7.04655	0.00	1.00	
1.2	0.34	-0.1	0.47181	0.30561	1179.54	26144.76	161.6934	2.76338	0.00	1.00	
1.25	0.39	0.3	0.58400	0.42142	1460	25318.47	158.1178	1.04552	0.15	0.85	
1.3	0.44	0.7	0.68969	0.54407	1724.23	21567.84	146.8599	-0.6664	0.75	0.25	
1.35	0.49	1.0	0.76025	0.63370	1900.63	17590.17	132.6279	-2.068	0.98	0.02	
1.4	0.54	1.4	0.83690	0.74170	2097.25	12005.37	109.569	-4.2977	1.00	0.00	
1.5	0.64	2.2	0.94010	0.85992	2350.26	3868.703	62.1989	-11.639	1.00	0.00	

Number of Samples	
LBGR	0.352
Δ/c	4.94
Pv	1
N	25.23
N/2	13
Actual N	25
SU σ	0.131
Z(1-α/2)	2.326
Z(1-β)	1.645



QUANTILE TEST

From NUREG 1505, Table A.7b Values of r and k for the Quantile Test When α is Approximately 0.025

25	n (number of survey unit measurements)
10	m (number of reference area measurements)
100	m
25	n
4	r
3	k
0.025	alpha

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

# of R:	100	n
# of S:	25	m
Avg Rank R:	75.5	
Avg Rank S:	13	

For m or n greater than 20, the critical value (k) can be calculated from

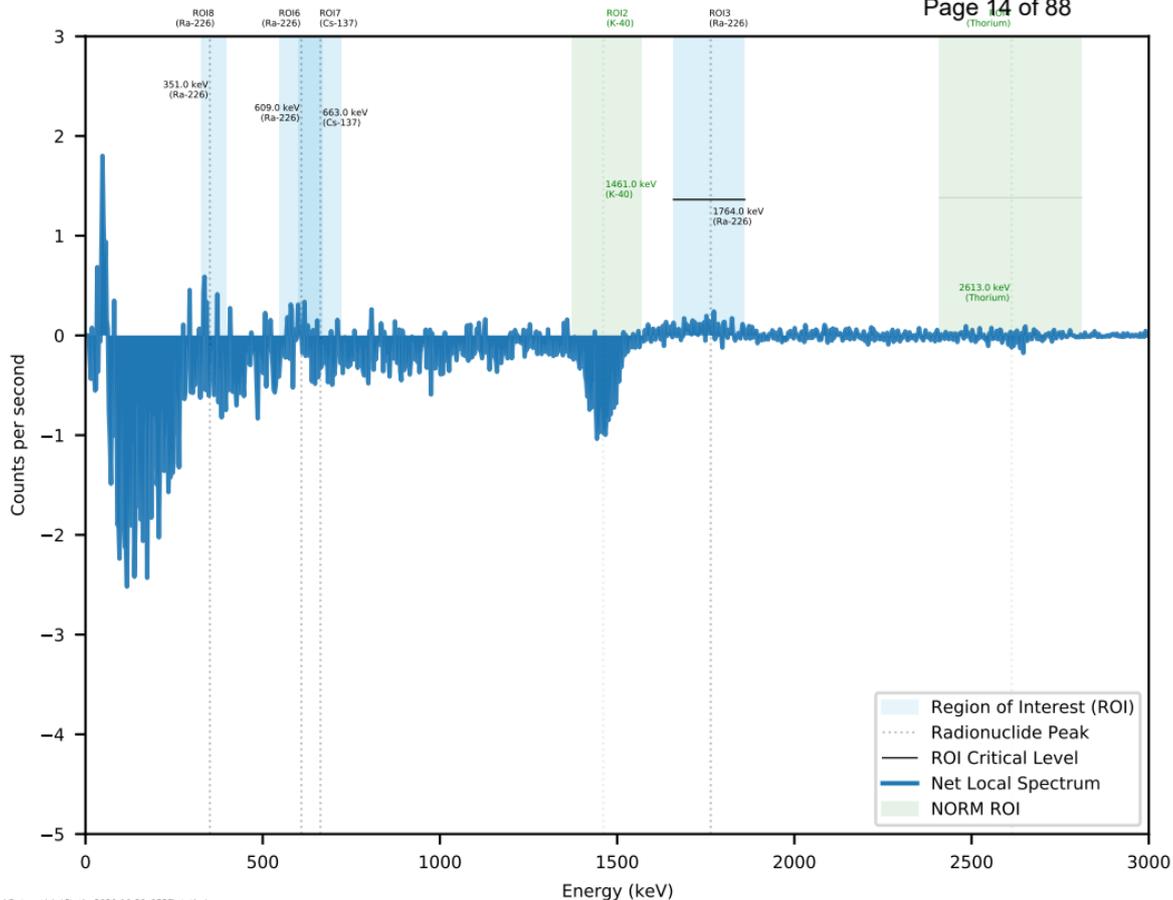
$$\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$$

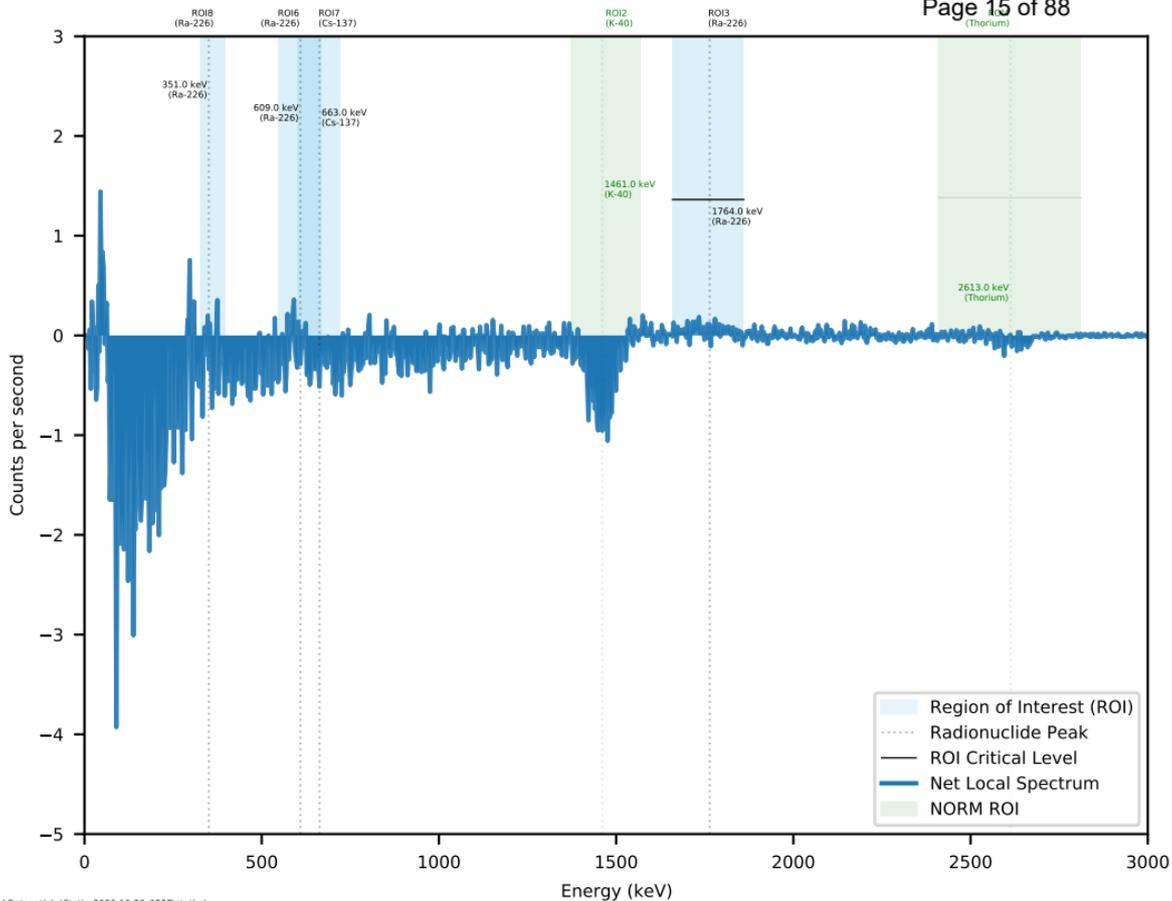
$z = 99.0\%$ percentile of standard normal distribution = 2

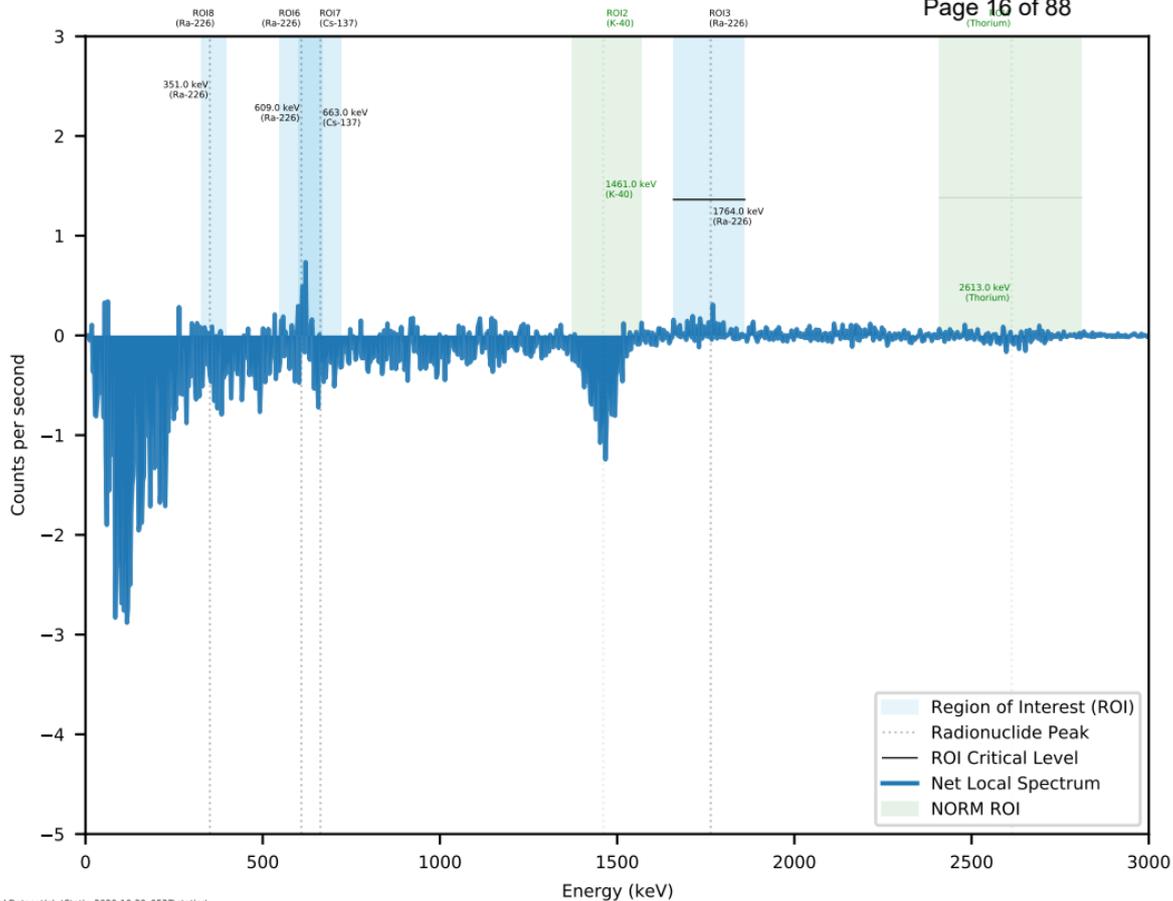
$k = 1951.9$

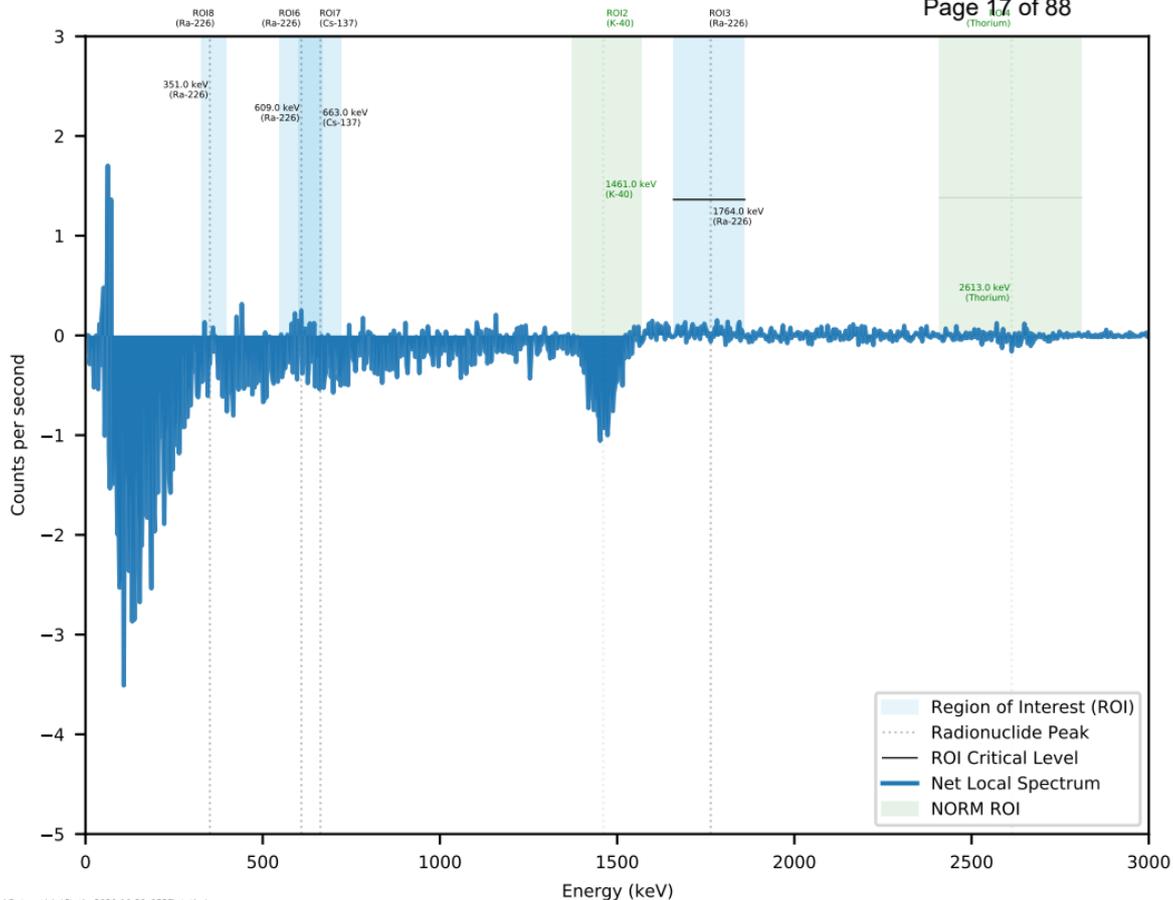
$\alpha = 0.2 = 0.01$
 $\beta = 0.05$

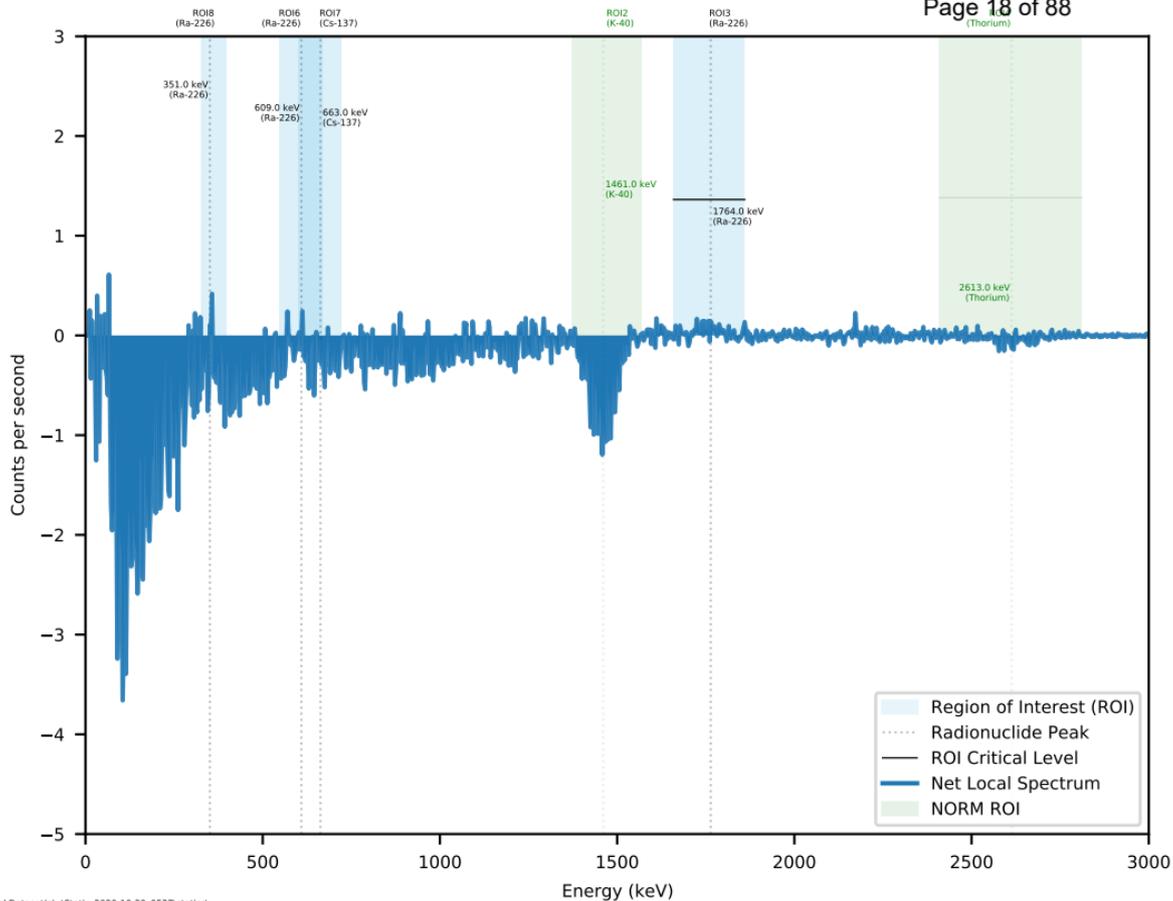
Since the sum of the survey unit ranks is less than the critical value, the null hypothesis that the survey unit concentrations do not exceed the LBGR is accepted (i.e., survey unit passes).

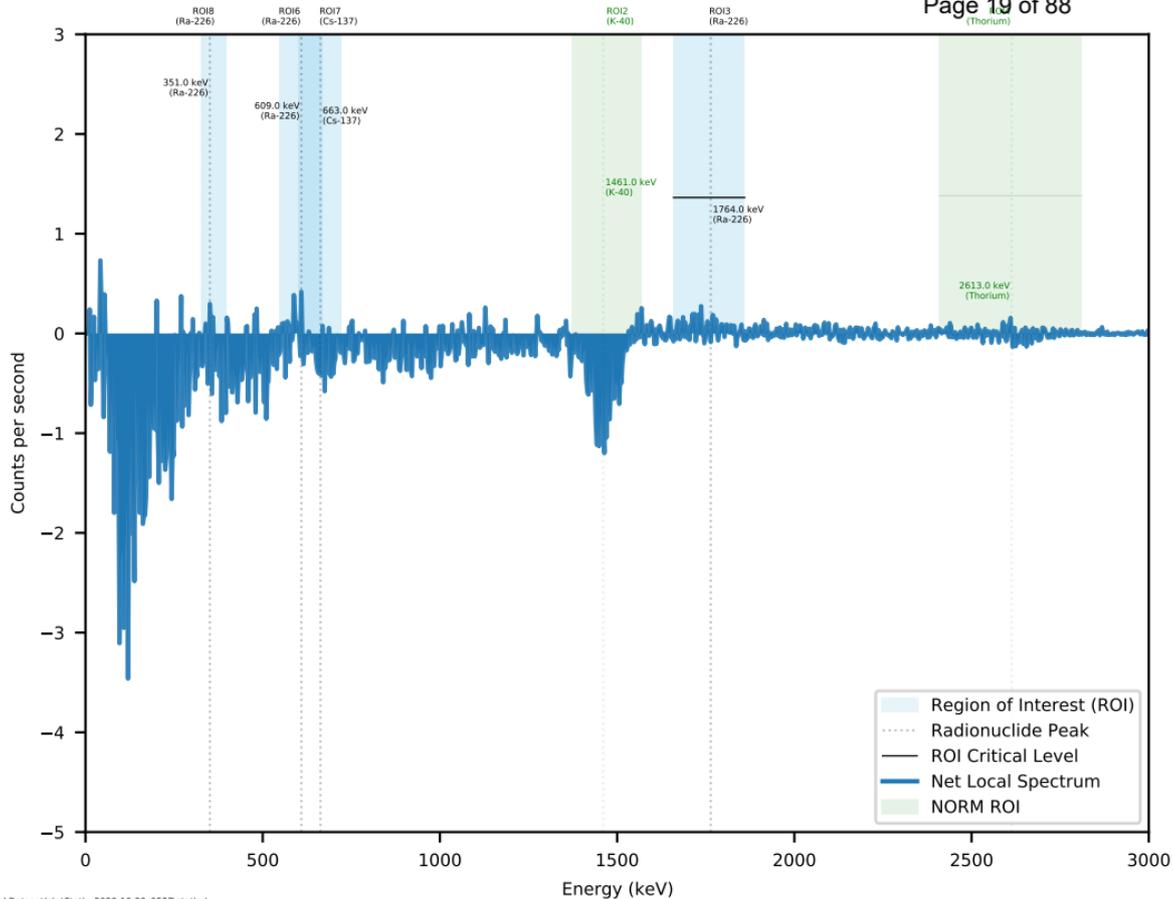


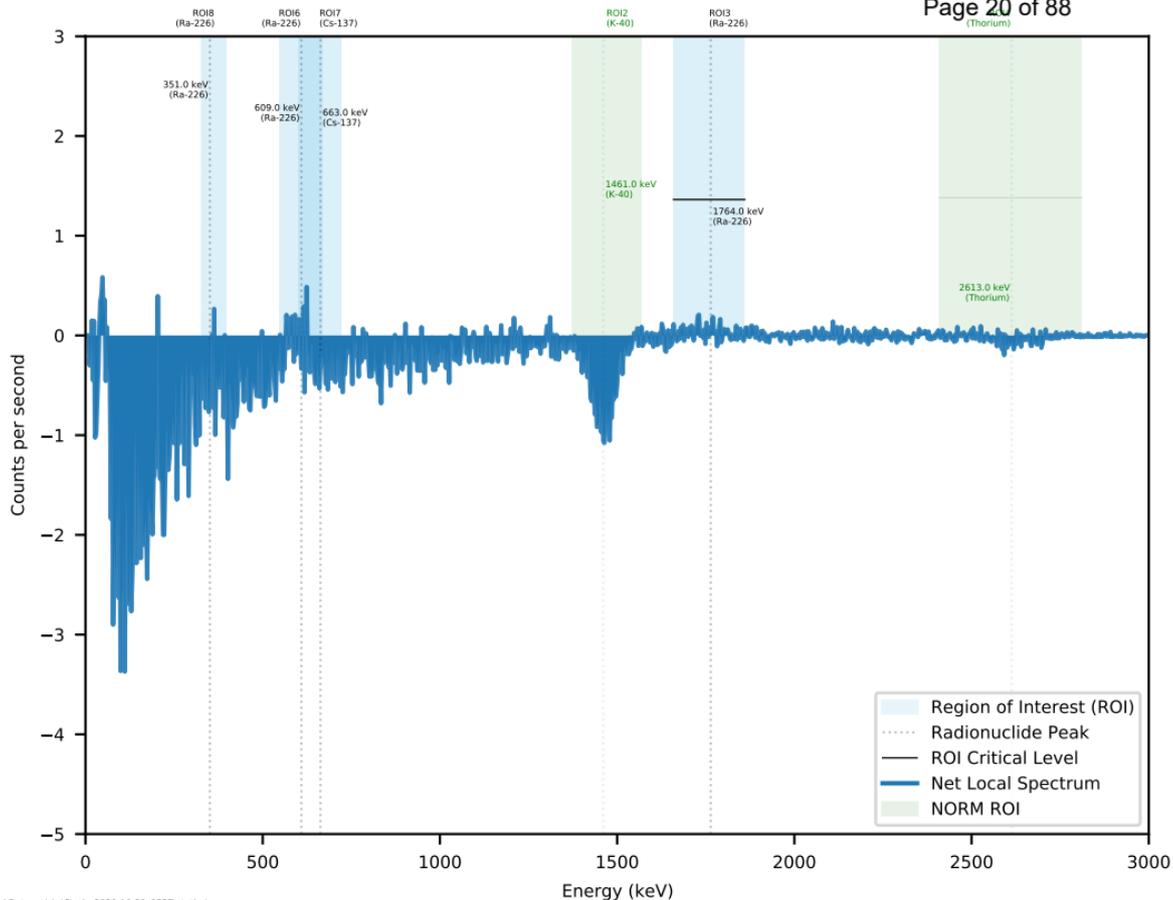


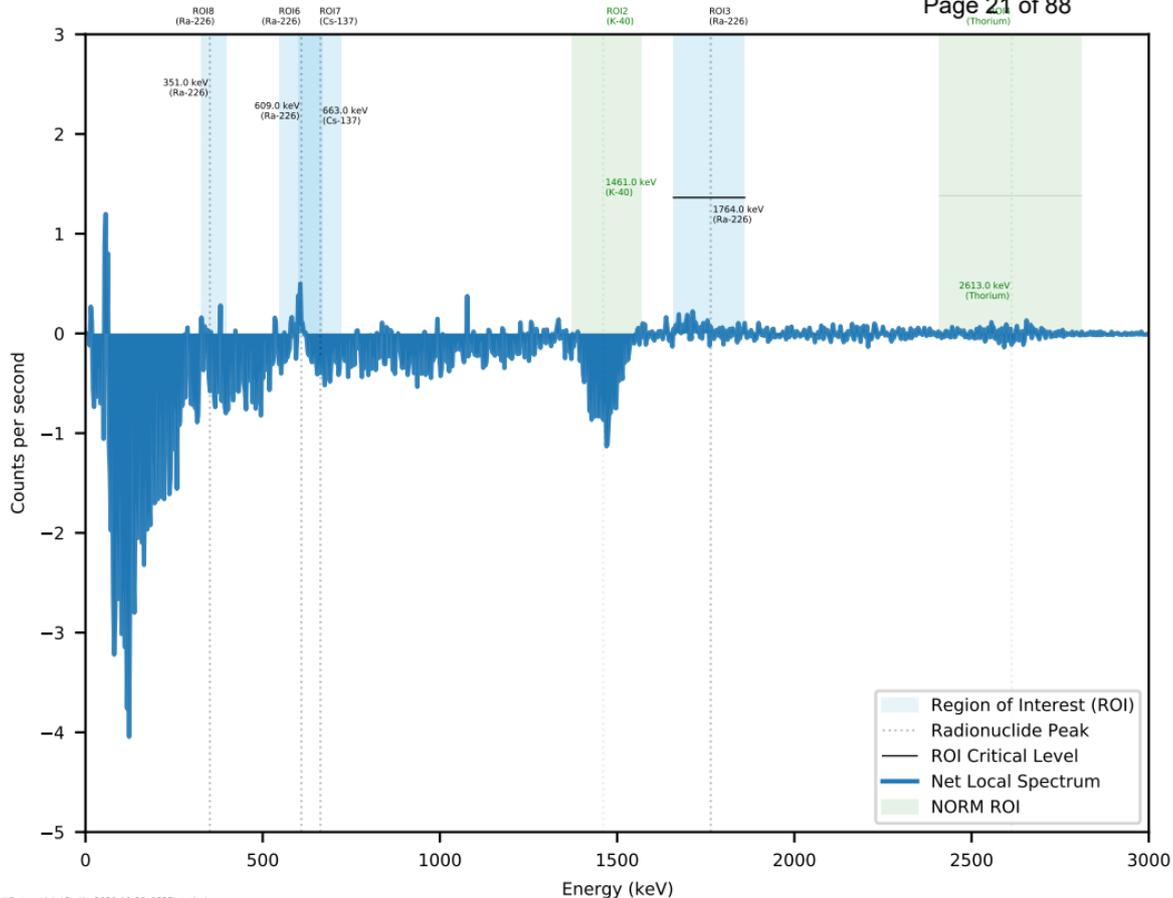


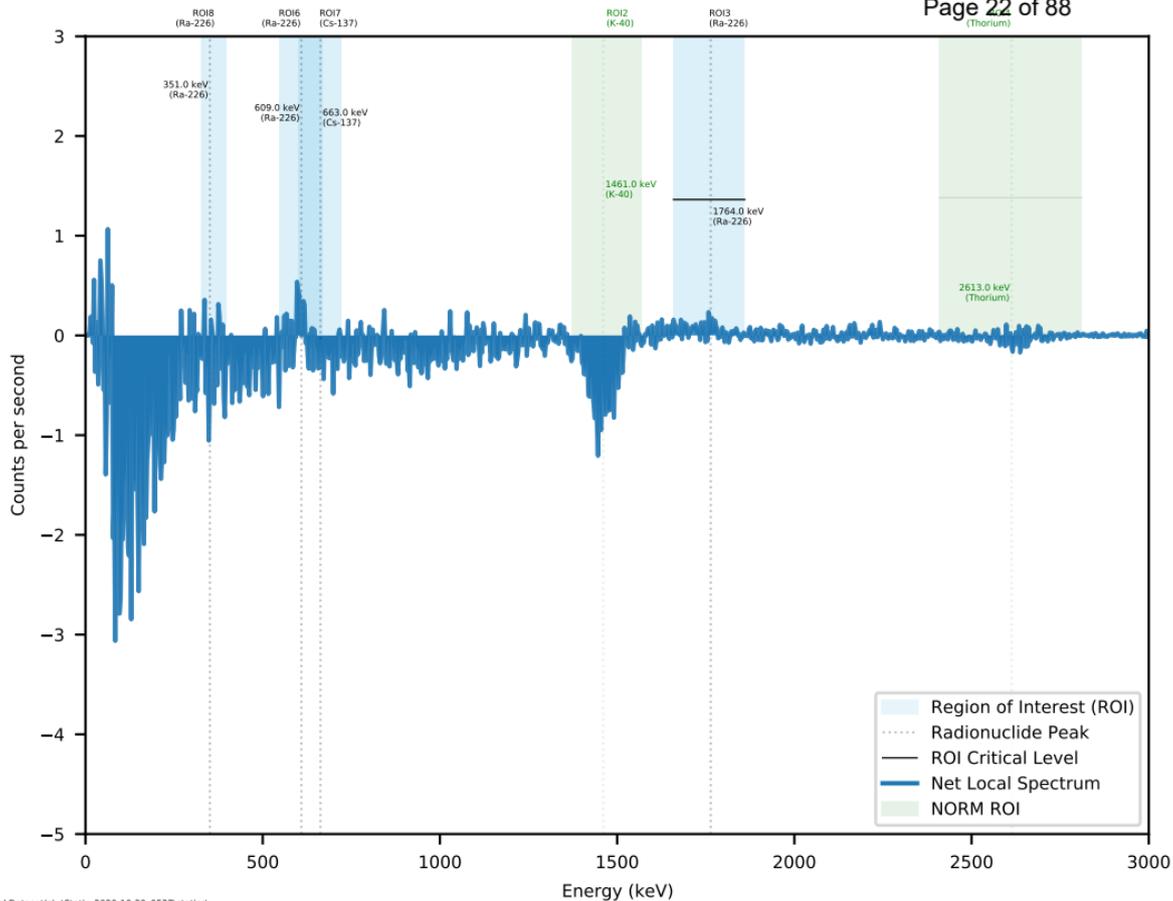


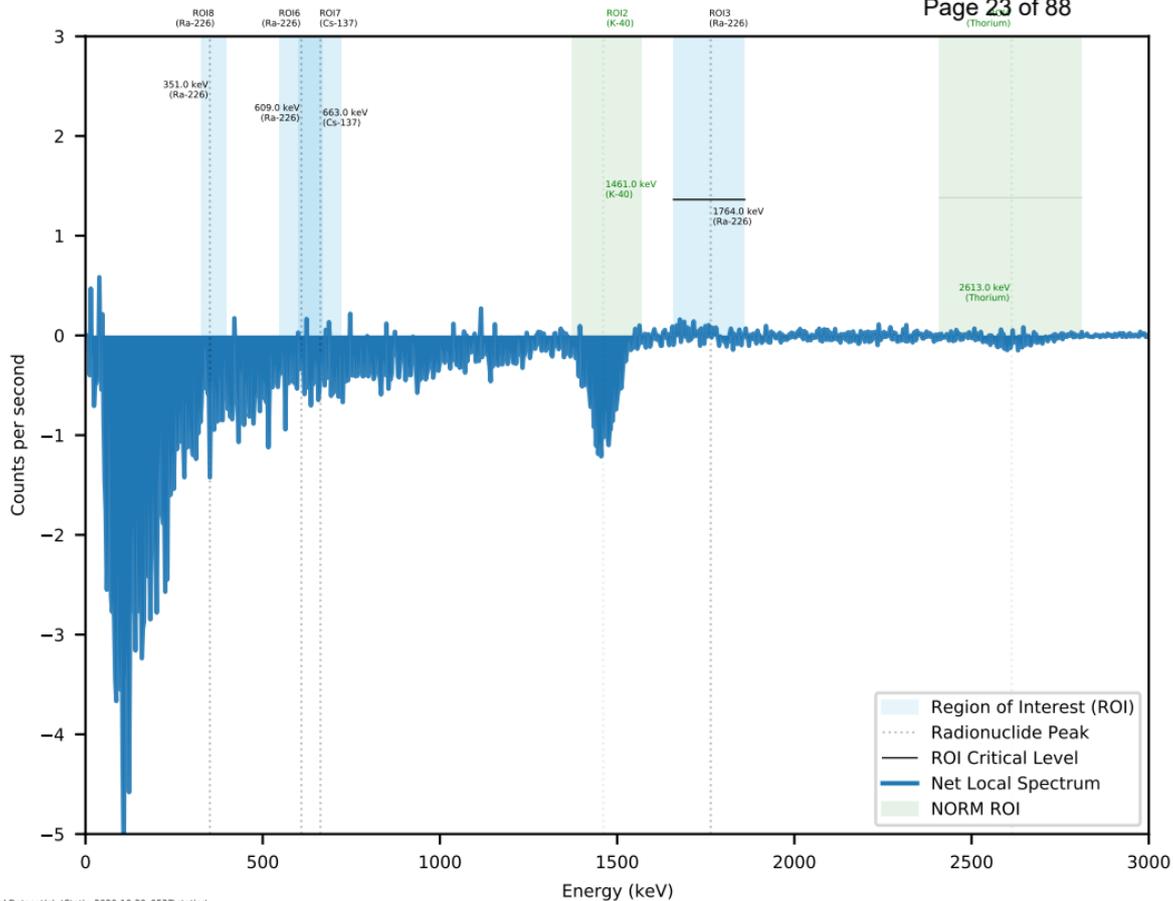


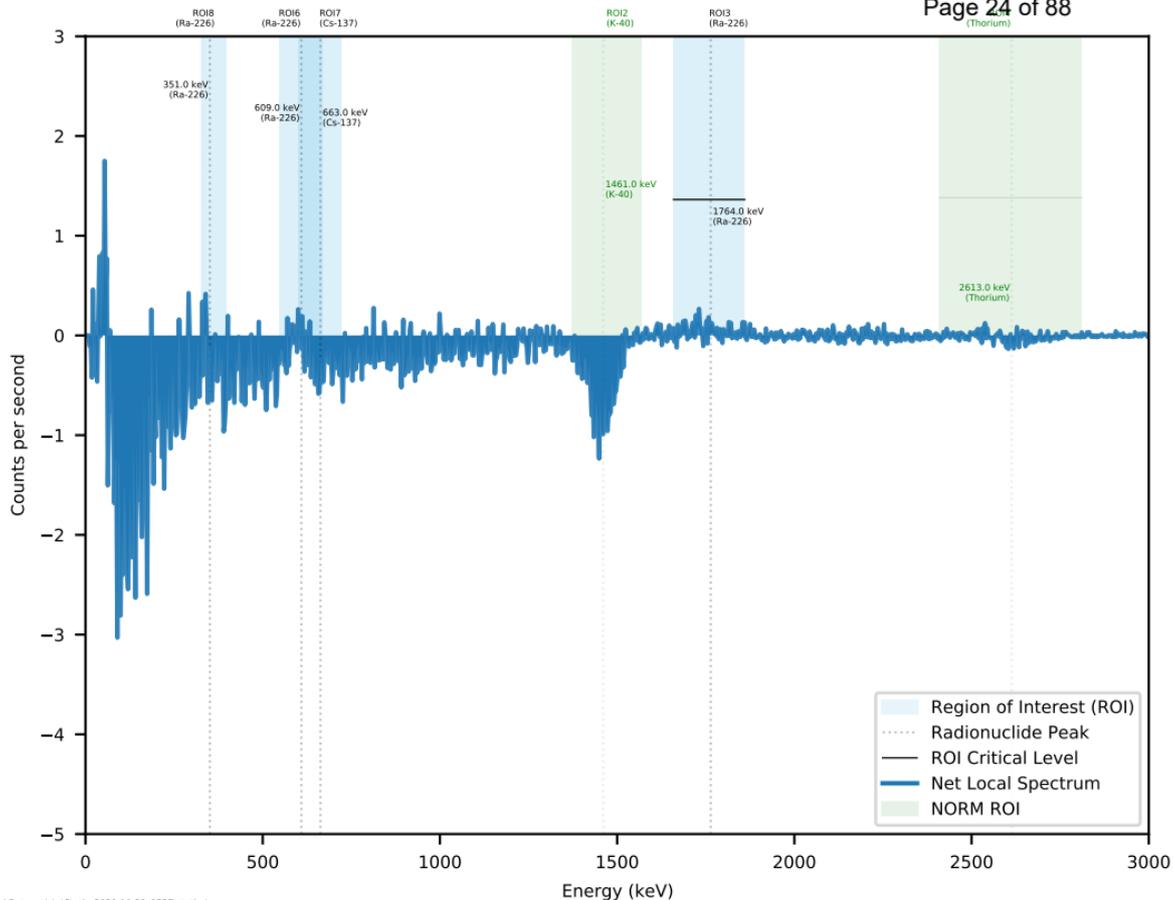


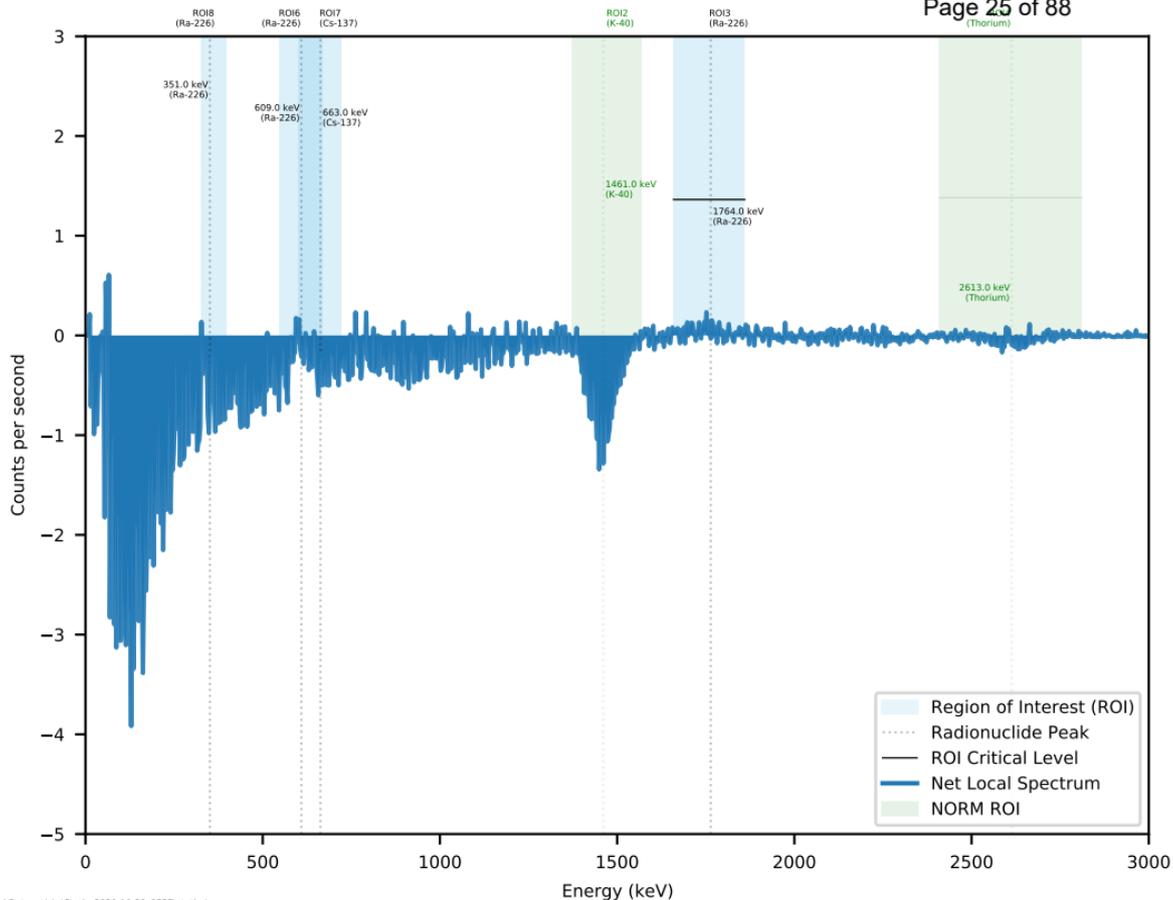


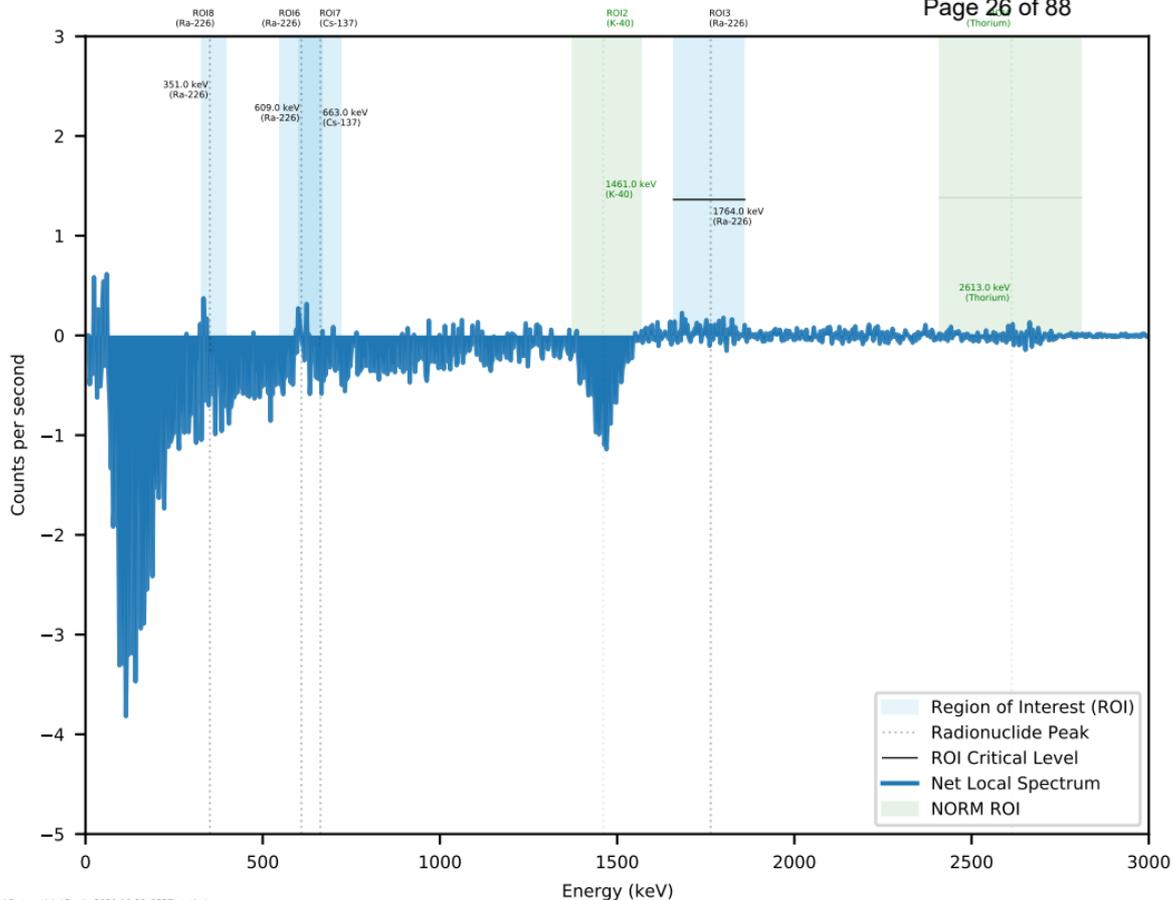


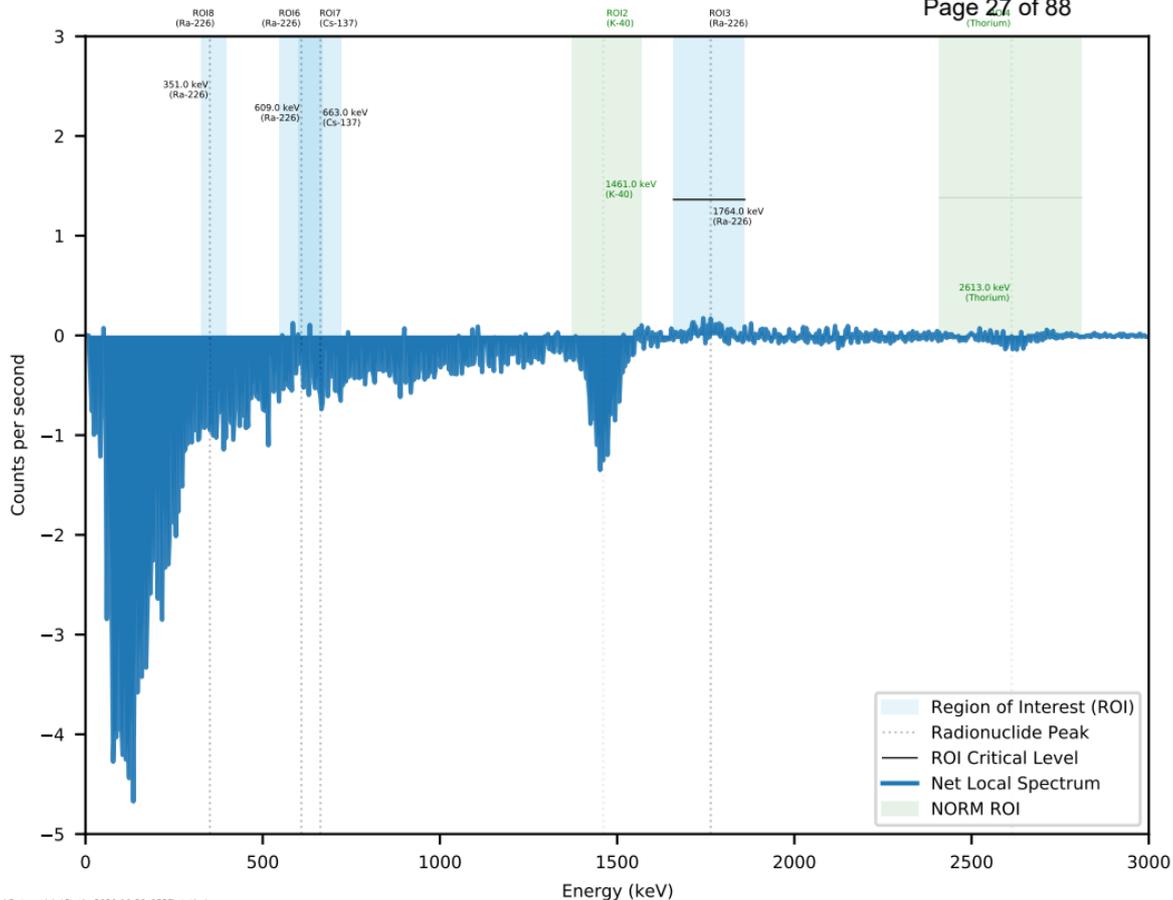


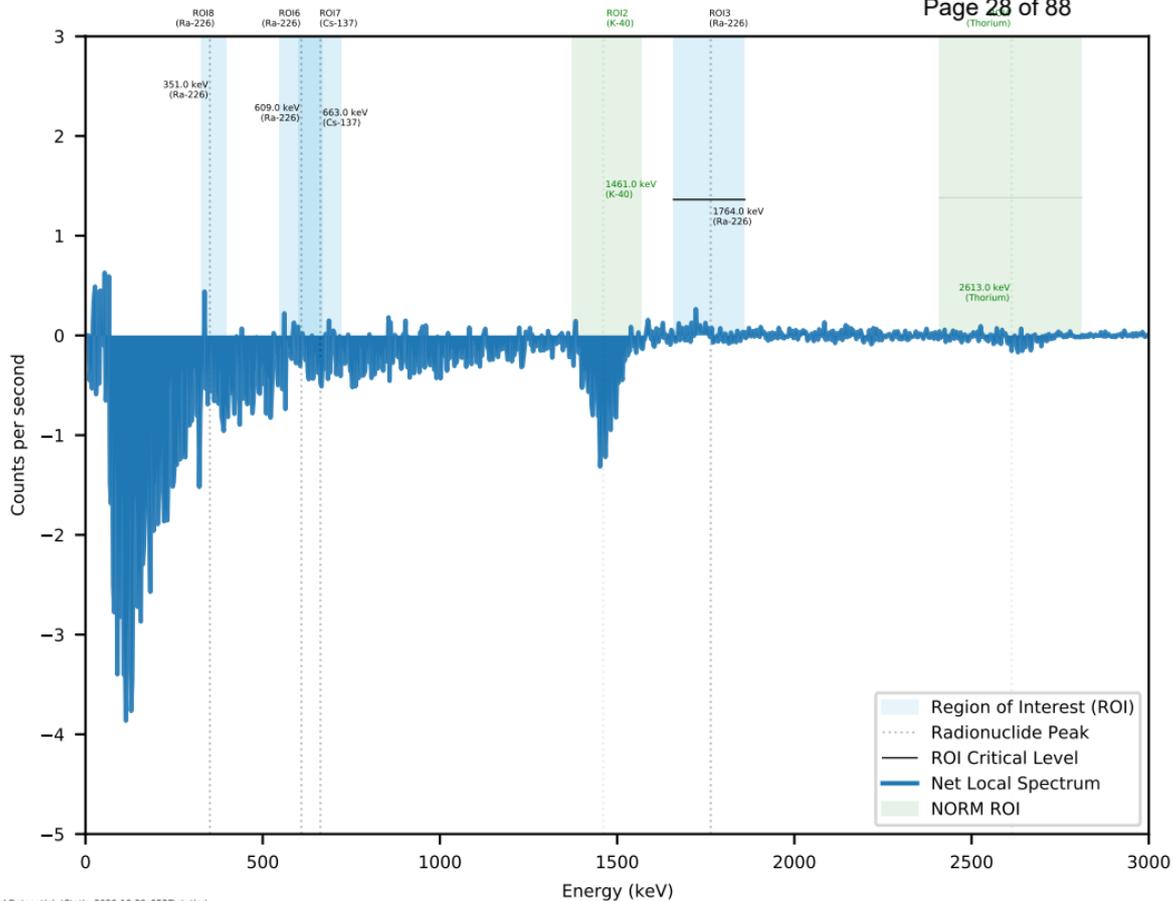


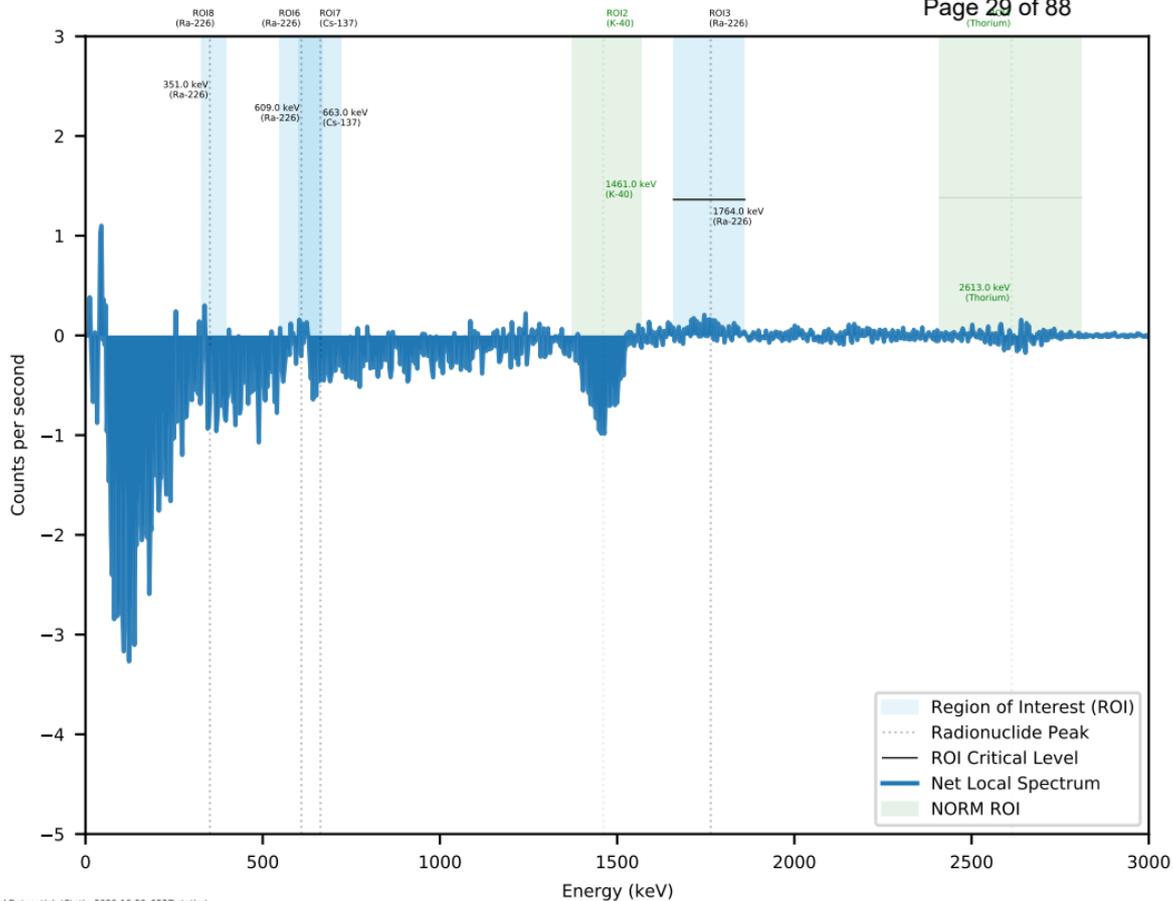


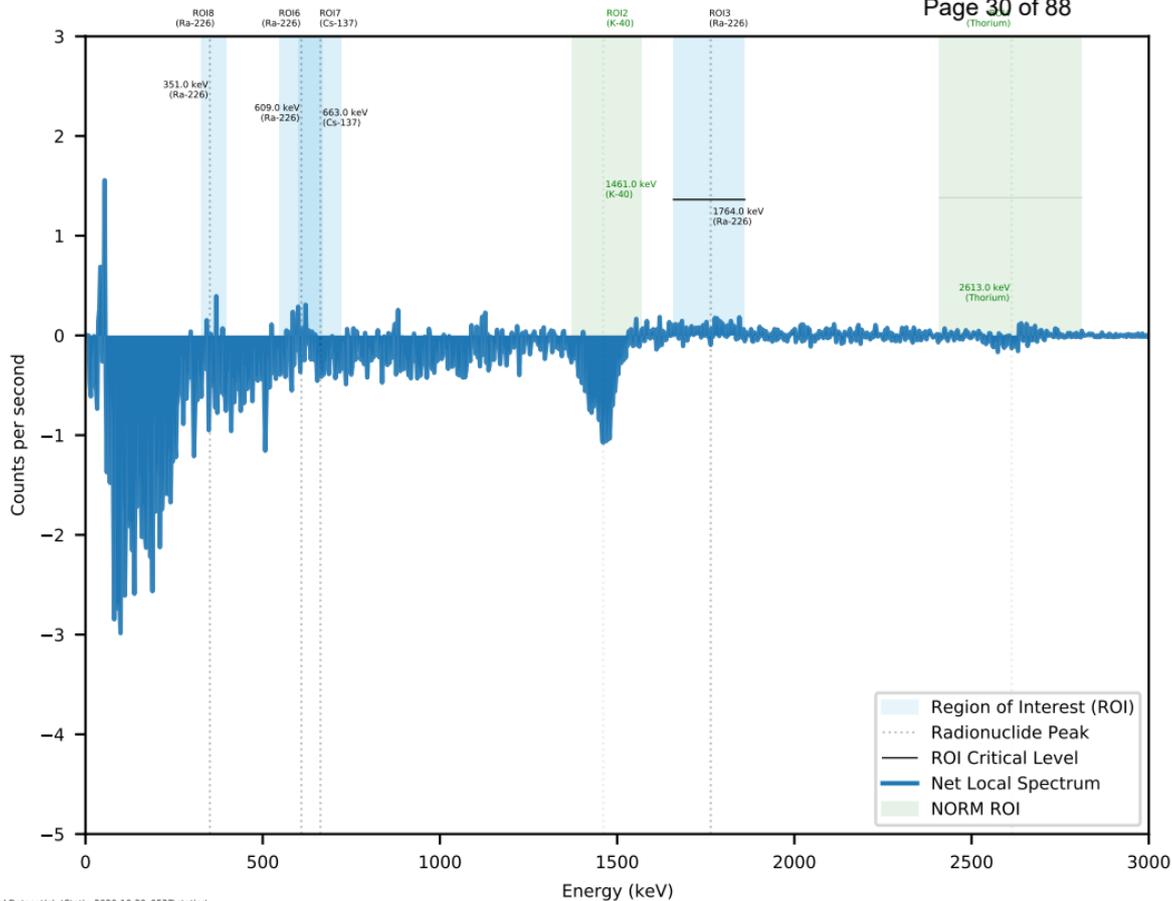


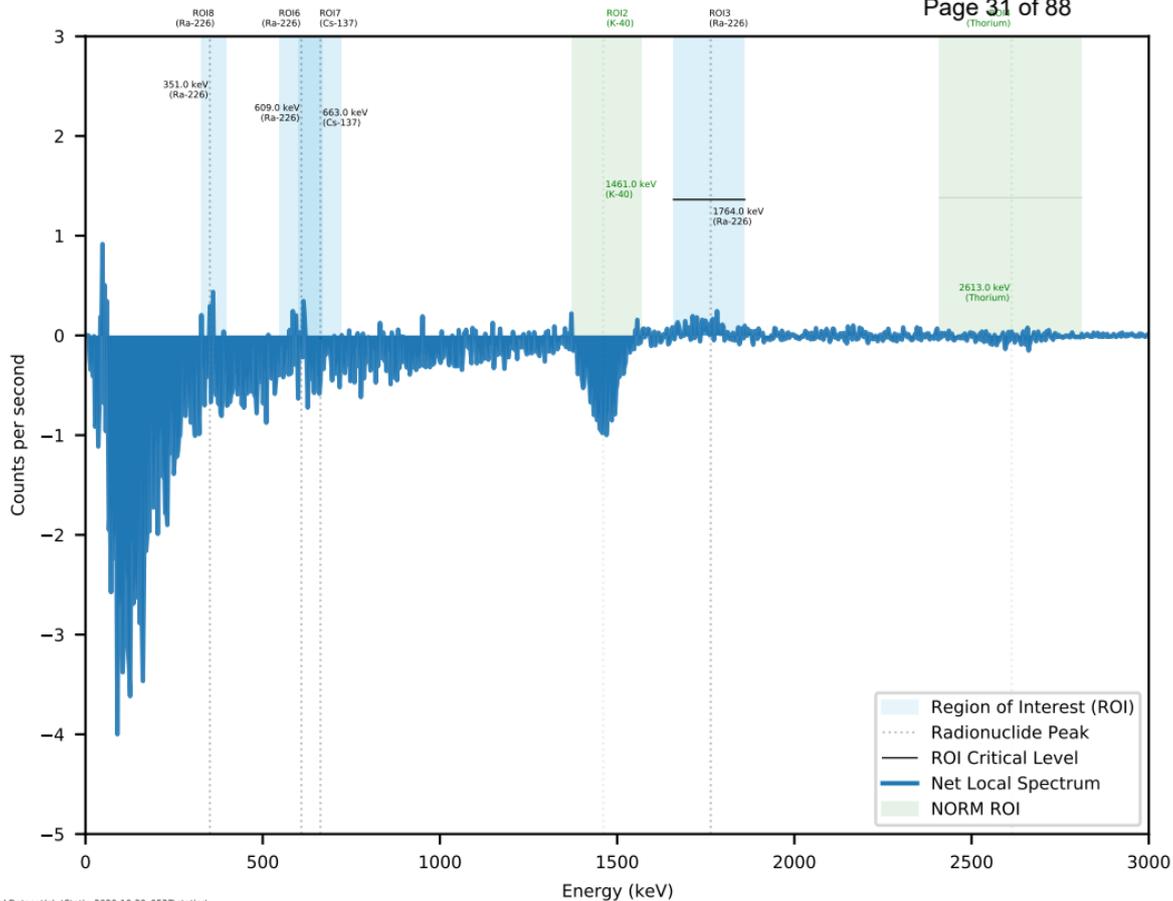


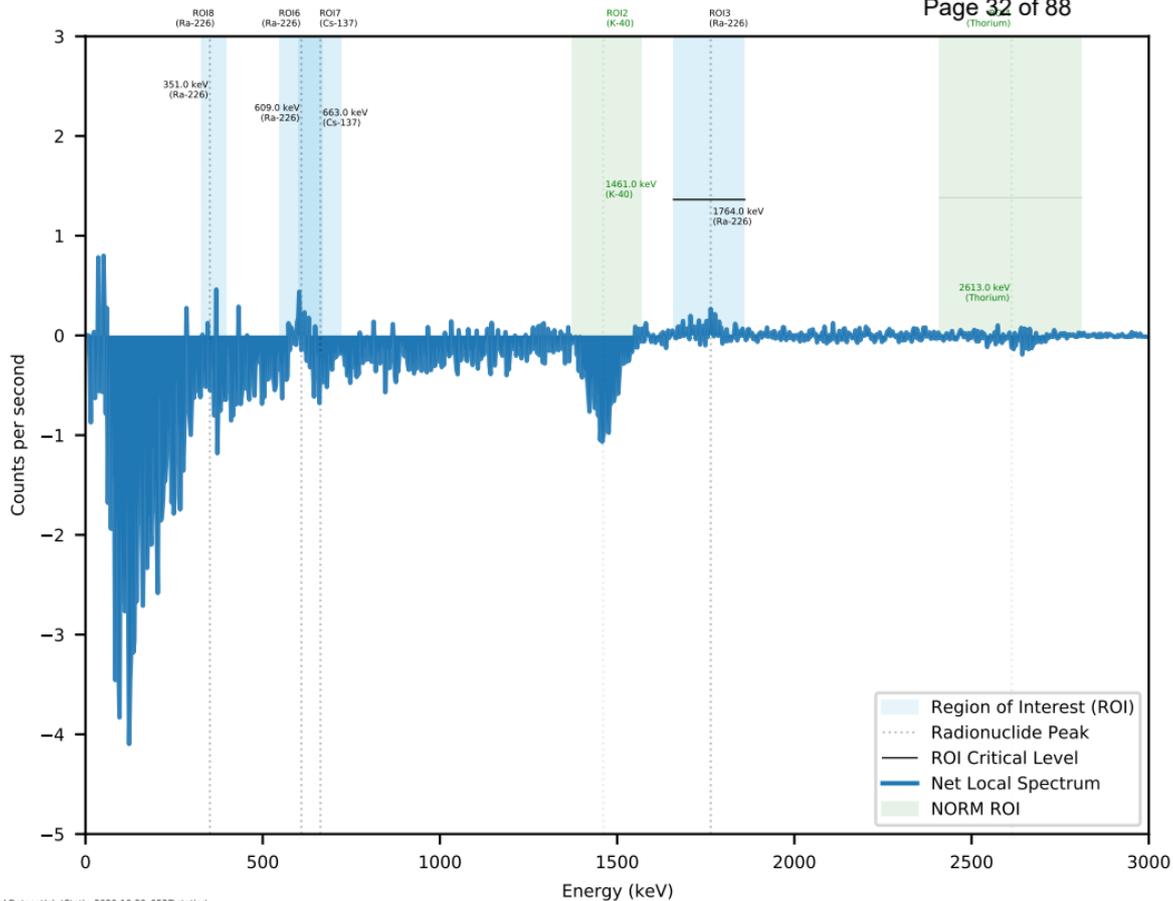


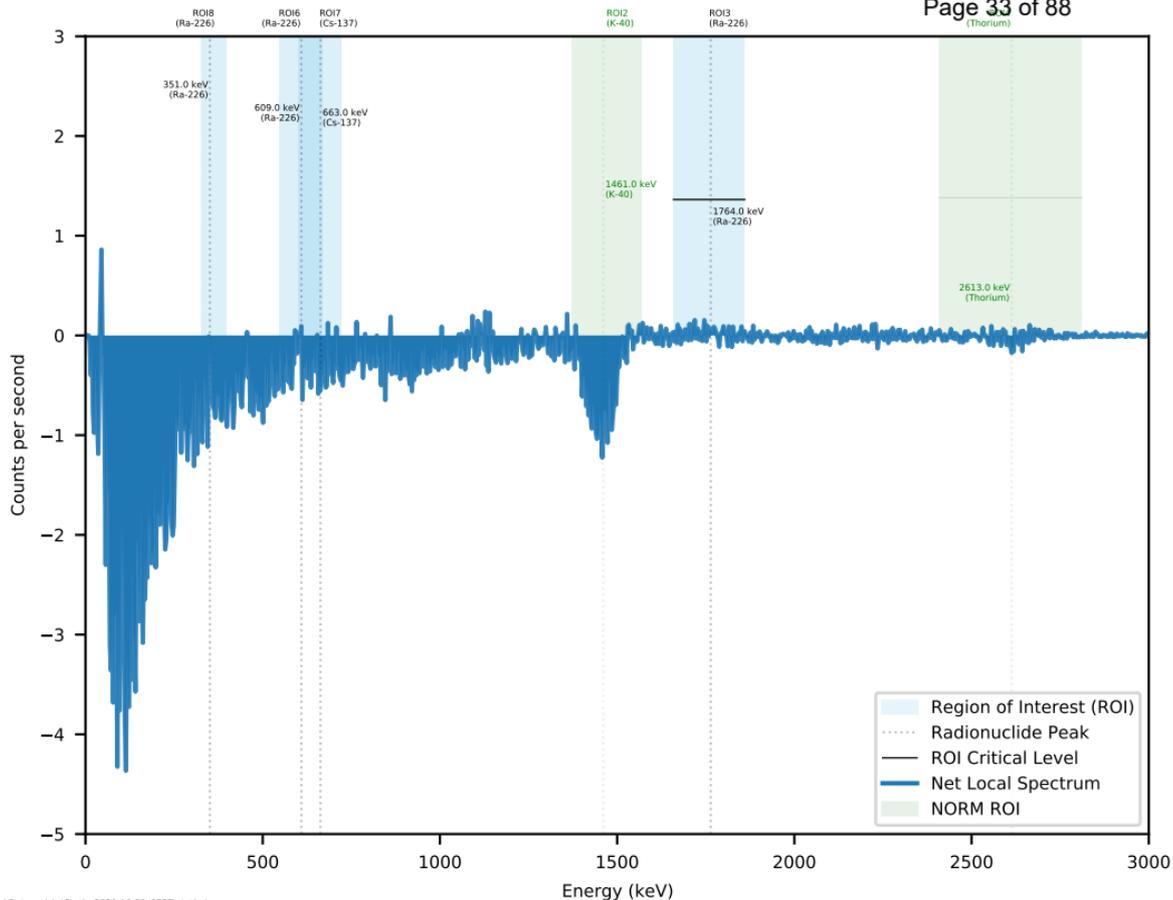


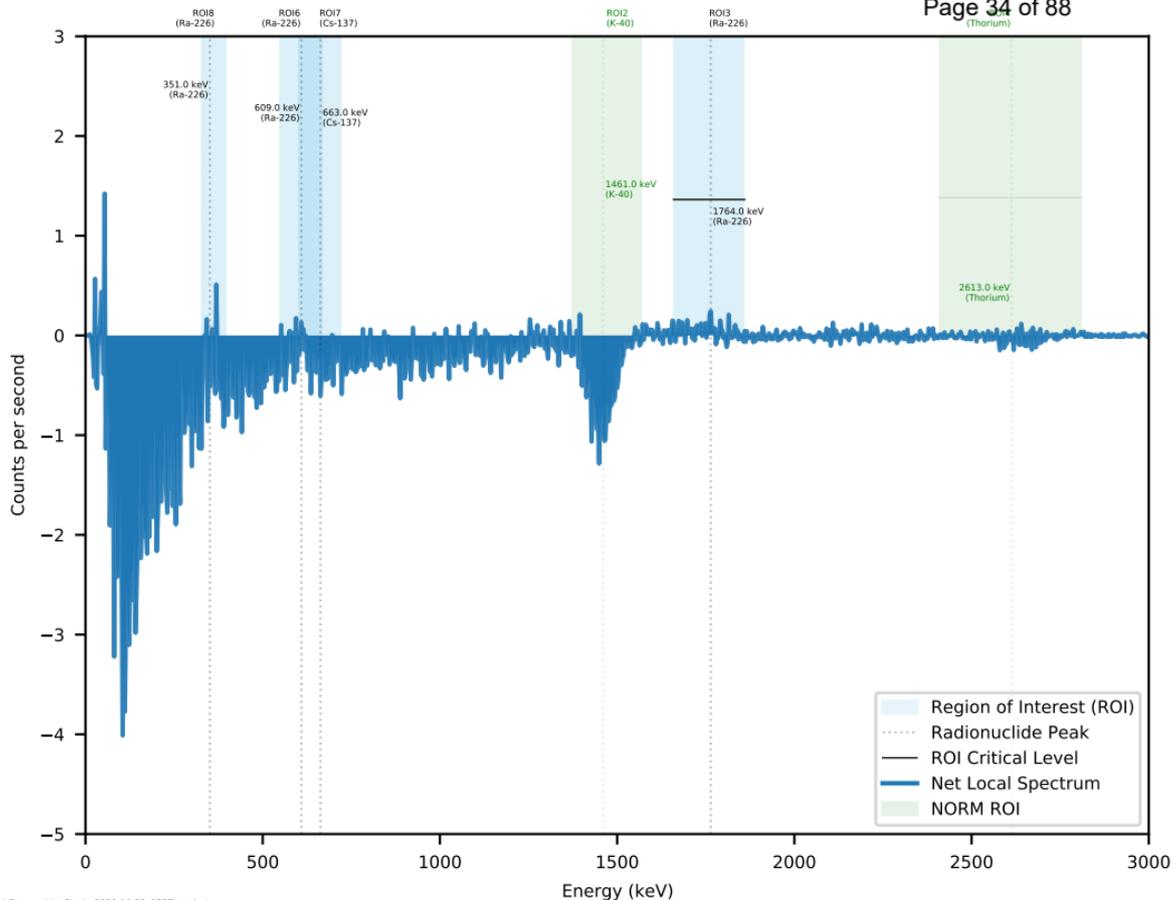


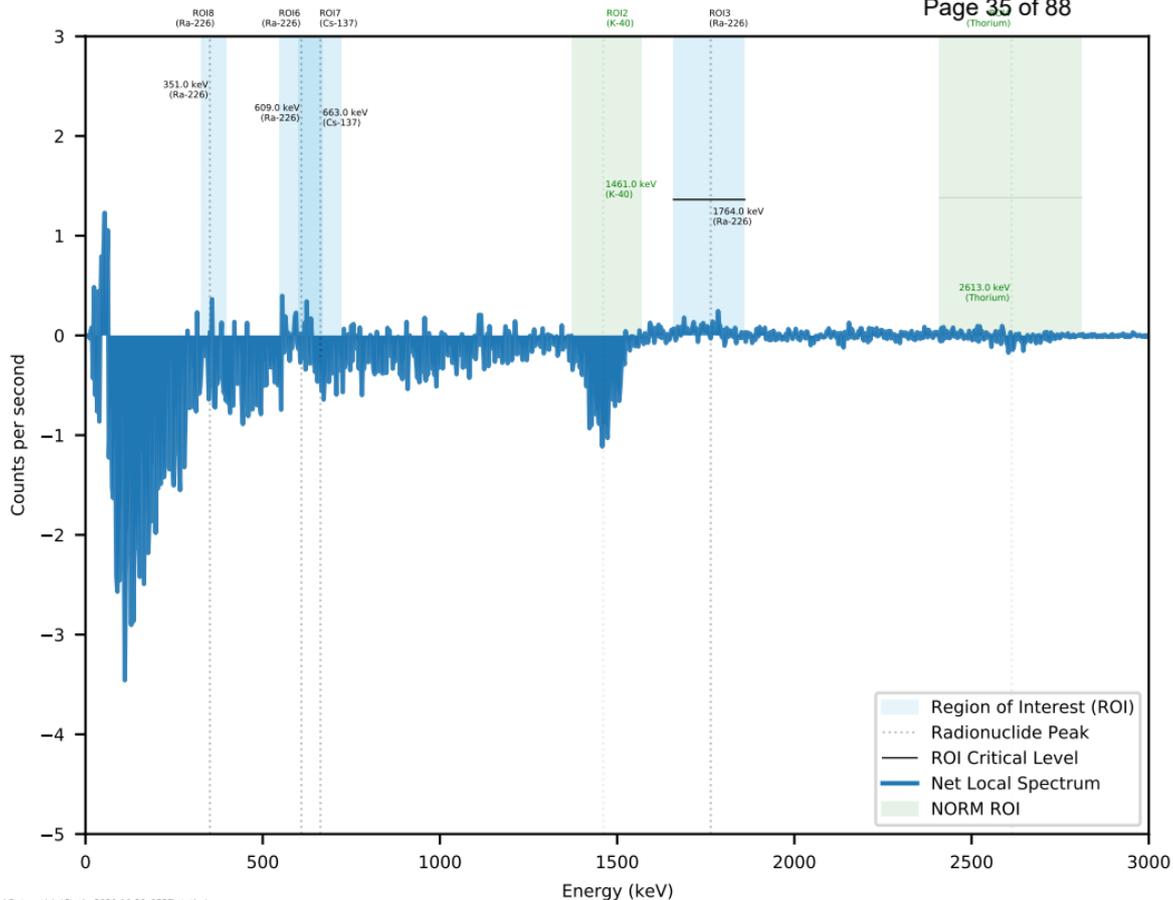


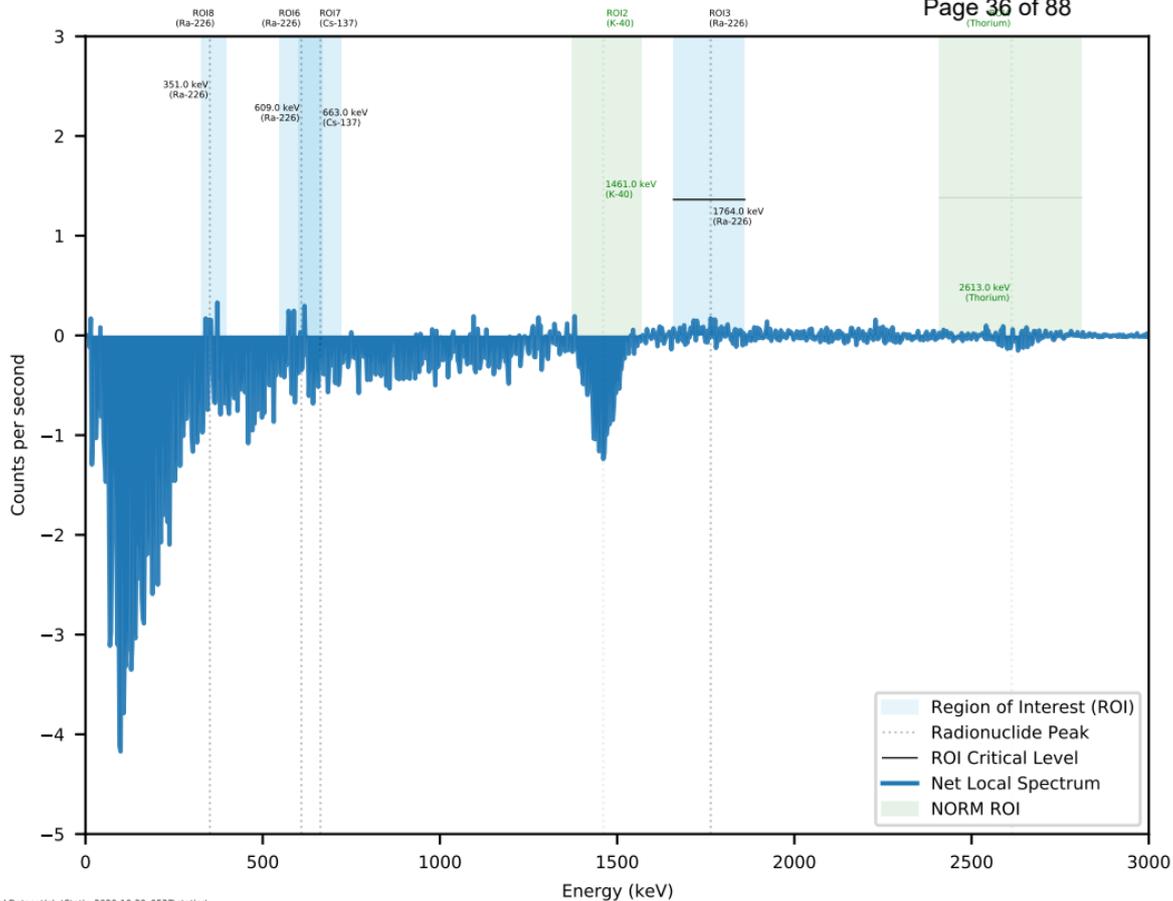


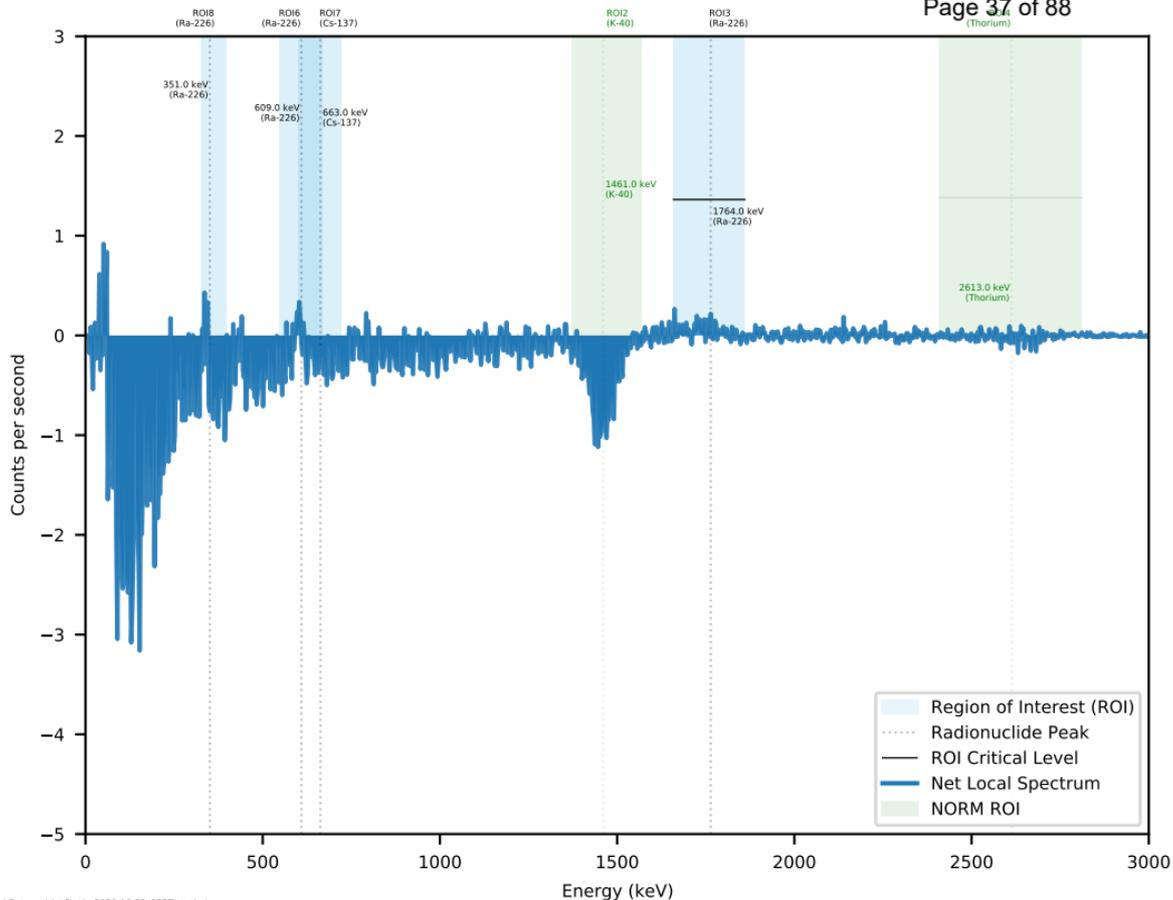


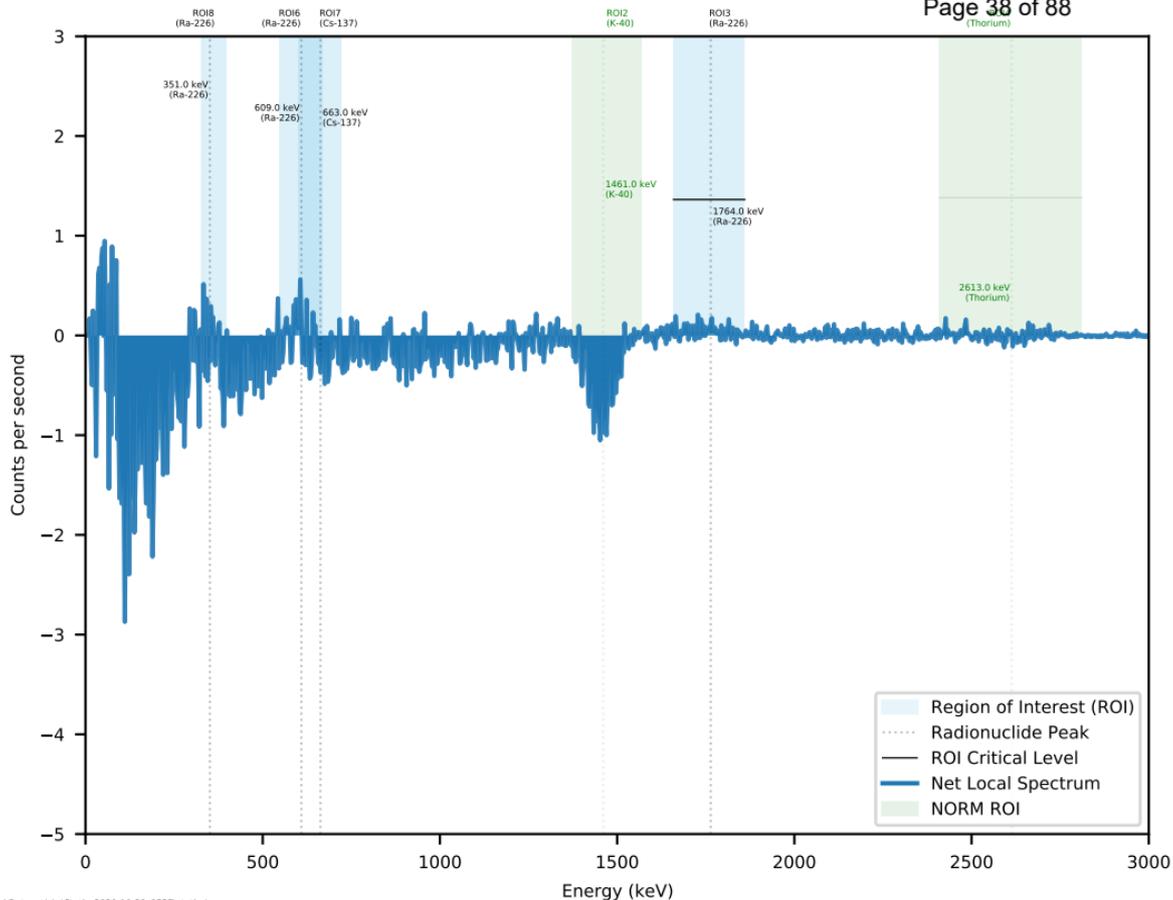














Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40217-1
Laboratory Sample Delivery Group: GJ46599774
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/8/2021 11:56:53 AM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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6

7

8

9

10

11

12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	6
Receipt Checklists	10
Definitions/Glossary	11
Method Summary	12
Sample Summary	13
Client Sample Results	14
QC Sample Results	29
QC Association Summary	33
Tracer Carrier Summary	35

Case Narrative

Page 41 of 88

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
SDG: GJ46599774

Job ID: 160-40217-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40217-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
SDG: GJ46599774

Job ID: 160-40217-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 11/02/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.9 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-F-025 (160-40217-1), HPPG-SFU-TU098B-001 (160-40217-3), HPPG-SFU-TU098B-011 (160-40217-13) and HPPG-SFU-TU098B-021 (160-40217-23) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 11/04/2020, prepared on 11/25/2020 and analyzed on 12/11/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU098B-011 (160-40217-13), HPPG-SFU-TU098B-021 (160-40217-23), (160-40217-A-13-A DU), HPPG-F-025 (160-40217-1) and HPPG-SFU-TU098B-001 (160-40217-3).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-F-025 (160-40217-1), HPPG-F-026 (160-40217-2), HPPG-SFU-TU098B-001 (160-40217-3), HPPG-SFU-TU098B-002 (160-40217-4), HPPG-SFU-TU098B-003 (160-40217-5), HPPG-SFU-TU098B-004 (160-40217-6), HPPG-SFU-TU098B-005 (160-40217-7), HPPG-SFU-TU098B-006 (160-40217-8), HPPG-SFU-TU098B-007 (160-40217-9), HPPG-SFU-TU098B-008 (160-40217-10), HPPG-SFU-TU098B-009 (160-40217-11), HPPG-SFU-TU098B-010 (160-40217-12), HPPG-SFU-TU098B-011 (160-40217-13), HPPG-SFU-TU098B-012 (160-40217-14), HPPG-SFU-TU098B-013 (160-40217-15), HPPG-SFU-TU098B-014 (160-40217-16), HPPG-SFU-TU098B-015 (160-40217-17), HPPG-SFU-TU098B-016 (160-40217-18), HPPG-SFU-TU098B-017 (160-40217-19), HPPG-SFU-TU098B-018 (160-40217-20), HPPG-SFU-TU098B-019 (160-40217-21), HPPG-SFU-TU098B-020 (160-40217-22), HPPG-SFU-TU098B-021 (160-40217-23), HPPG-SFU-TU098B-022 (160-40217-24), HPPG-SFU-TU098B-023 (160-40217-25), HPPG-SFU-TU098B-024 (160-40217-26) and HPPG-SFU-TU098B-025 (160-40217-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/04/2020, prepared on 11/06/2020 and analyzed on 11/29/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211

Case Narrative

Page 43 of 88

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
SDG: GJ46599774

Job ID: 160-40217-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Bi-214 Ra-226

Gamma Prep Batch 488492

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-SFU-TU098B-022 (160-40217-24).

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488492/1-A)

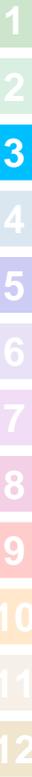
Gamma prep batch 488491

The method blank (MB) z-score is within limits and is stored in the level IV raw data. (MB 160-488491/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-SFU-TU098B-001 (160-40217-3), (HPPG-SFU-TU098B-016 (160-40217-18).

The replicate precision for Bi-212 associated with Prep Batch 160-488207 and 160-488491 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40217-A-20-C DU).

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





CHAIN OF CUSTODY

Ref. Document # 501197RSY-023

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri
Paul LeBlanc

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/30/2020
Waybill Number: 4957 0225 4307
Lab Destination: Test America (St. Louis Lab) 35
Earth City, MO 63046 10/30/20

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested

Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Analysis Requested				Dose Rate uR/Hr	Evidence Bag ID	Comment	



160-40217 Chain of Custody

Page 6 of 35

Sample ID	Collection Information			Matrix	# of Containers	Container Type	X	X				Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method											
HPPG-F-025	10/29/2020	14:29	G	SO	1	16 oz. plastic jar	X	X				5	GJ46599774	
HPPG-F-026	10/29/2020	14:57	G	SO	1	16 oz. plastic jar	X					5	GJ46599774	
HPPG-SFU-TU098B-001	10/29/2020	13:52	G	SO	1	16 oz. plastic jar	X	X				5	GJ46599774	
HPPG-SFU-TU098B-002	10/29/2020	13:56	G	SO	1	16 oz. plastic jar	X					5	GJ46599774	
HPPG-SFU-TU098B-003	10/29/2020	14:01	G	SO	1	16 oz. plastic jar	X					5	GJ46599774	
HPPG-SFU-TU098B-004	10/29/2020	14:05	G	SO	1	16 oz. plastic jar	X					5	GJ46599774	
HPPG-SFU-TU098B-005	10/29/2020	14:08	G	SO	1	16 oz. plastic jar	X					5	GJ46599774	
HPPG-SFU-TU098B-006	10/29/2020	14:11	G	SO	1	16 oz. plastic jar	X					5	GJ46599774	

Special Instructions: 21 day ingrowth results only
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other

Level of QC Required: I II III Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/29/2020 15:55	Locked Storage (RKillpack)		10/29/2020 15:55
Locked Storage (RKillpack)		10/30/2020 15:39	Devin Lewis		10/30/2020 15:39
Devin Lewis		10/30/2020 15:42	SHIPPEDTOLAB	FED EX	

*** Last 3 transfers shown above - Complete list of transfers on last page ***

FED EX

NOV 02 2020 08:50
MICHAKORRINHIZER



4/8/2021 (Rev. 1)



CHAIN OF CUSTODY

Ref. Document # 501197RSY-023

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri
Paul LeBlanc

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/30/2020
Waybill Number: 4957 0225 4307
Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)							
HPPG-SFU-TU098B-007	10/29/2020	14:14	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-008	10/29/2020	14:18	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-009	10/29/2020	14:22	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-010	10/29/2020	14:26	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-011	10/29/2020	14:29	G	SO	1	16 oz. plastic jar	X		X				5	GJ46599774	
HPPG-SFU-TU098B-012	10/29/2020	14:32	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-013	10/29/2020	14:34	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-014	10/29/2020	14:36	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-015	10/29/2020	14:38	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-016	10/29/2020	14:41	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-017	10/29/2020	14:42	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-018	10/29/2020	14:44	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-019	10/29/2020	14:46	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-020	10/29/2020	14:46	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-021	10/29/2020	14:48	G	SO	1	16 oz. plastic jar	X		X				5	GJ46599774	
HPPG-SFU-TU098B-022	10/29/2020	14:50	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-023	10/29/2020	14:53	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	





CHAIN OF CUSTODY

Ref. Document # 501197RSY-023

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri
Paul LeBlanc

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/30/2020
Waybill Number: 4957 0225 4307 ⁵⁸⁵¹
Lab Destination: Test America (St. Louis Lab) 13715 Rider Trail North Earth City, MO 63046 ^{10/30/20}

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)							
HPPG-SFU-TU098B-024	10/29/2020	14:54	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	
HPPG-SFU-TU098B-025	10/29/2020	14:57	G	SO	1	16 oz. plastic jar	X						5	GJ46599774	

RL



All Transfers for COC 501197RSY-023

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/29/2020 15:55	Locked Storage (RKillpack)		10/29/2020 15:55
Locked Storage (RKillpack)		10/30/2020 15:39	Devin Lewis		10/30/2020 15:39
Devin Lewis		10/30/2020 15:42	SHIPPEDTOLAB	FED EX	

FED EX

Michael Korringhizer
MICHA KORRINGHIZER

NOV 02 2020
08:50



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40217-1

SDG Number: GJ46599774

Login Number: 40217**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Hoerchler, Elizabeth M**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
SDG: GJ46599774

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
SDG: GJ46599774

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
SDG: GJ46599774

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40217-1	HPPG-F-025	Solid	10/29/20 14:29	11/02/20 08:50	
160-40217-2	HPPG-F-026	Solid	10/29/20 14:57	11/02/20 08:50	
160-40217-3	HPPG-SFU-TU098B-001	Solid	10/29/20 13:52	11/02/20 08:50	
160-40217-4	HPPG-SFU-TU098B-002	Solid	10/29/20 13:56	11/02/20 08:50	
160-40217-5	HPPG-SFU-TU098B-003	Solid	10/29/20 14:01	11/02/20 08:50	
160-40217-6	HPPG-SFU-TU098B-004	Solid	10/29/20 14:05	11/02/20 08:50	
160-40217-7	HPPG-SFU-TU098B-005	Solid	10/29/20 14:08	11/02/20 08:50	
160-40217-8	HPPG-SFU-TU098B-006	Solid	10/29/20 14:11	11/02/20 08:50	
160-40217-9	HPPG-SFU-TU098B-007	Solid	10/29/20 14:14	11/02/20 08:50	
160-40217-10	HPPG-SFU-TU098B-008	Solid	10/29/20 14:18	11/02/20 08:50	
160-40217-11	HPPG-SFU-TU098B-009	Solid	10/29/20 14:22	11/02/20 08:50	
160-40217-12	HPPG-SFU-TU098B-010	Solid	10/29/20 14:26	11/02/20 08:50	
160-40217-13	HPPG-SFU-TU098B-011	Solid	10/29/20 14:29	11/02/20 08:50	
160-40217-14	HPPG-SFU-TU098B-012	Solid	10/29/20 14:32	11/02/20 08:50	
160-40217-15	HPPG-SFU-TU098B-013	Solid	10/29/20 14:34	11/02/20 08:50	
160-40217-16	HPPG-SFU-TU098B-014	Solid	10/29/20 14:36	11/02/20 08:50	
160-40217-17	HPPG-SFU-TU098B-015	Solid	10/29/20 14:38	11/02/20 08:50	
160-40217-18	HPPG-SFU-TU098B-016	Solid	10/29/20 14:41	11/02/20 08:50	
160-40217-19	HPPG-SFU-TU098B-017	Solid	10/29/20 14:42	11/02/20 08:50	
160-40217-20	HPPG-SFU-TU098B-018	Solid	10/29/20 14:44	11/02/20 08:50	
160-40217-21	HPPG-SFU-TU098B-019	Solid	10/29/20 14:46	11/02/20 08:50	
160-40217-22	HPPG-SFU-TU098B-020	Solid	10/29/20 14:46	11/02/20 08:50	
160-40217-23	HPPG-SFU-TU098B-021	Solid	10/29/20 14:48	11/02/20 08:50	
160-40217-24	HPPG-SFU-TU098B-022	Solid	10/29/20 14:50	11/02/20 08:50	
160-40217-25	HPPG-SFU-TU098B-023	Solid	10/29/20 14:53	11/02/20 08:50	
160-40217-26	HPPG-SFU-TU098B-024	Solid	10/29/20 14:54	11/02/20 08:50	
160-40217-27	HPPG-SFU-TU098B-025	Solid	10/29/20 14:57	11/02/20 08:50	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-F-025

Lab Sample ID: 160-40217-1

Date Collected: 10/29/20 14:29

Matrix: Solid

Date Received: 11/02/20 08:50

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.00509	U	0.0524	0.0524	0.160	0.0435	pCi/g	11/25/20 14:30	12/11/20 07:06	1
Carrier	%Yield	Qualifier	Limits							
Sr Carrier	105		40 - 110							
					Prepared	Analyzed		Dil Fac		
					11/25/20 14:30	12/11/20 07:06		1		

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.411		0.185	0.190		0.127	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Actinium-227	0.113	U	0.542	0.543		0.333	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Bismuth-212	0.000	U	0.454	0.454		0.635	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Bismuth-214	0.0764	U	0.154	0.155		0.148	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Cesium-137	-0.0392	U	0.0679	0.0680	0.0700	0.0528	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Lead-210	1.05		1.50	1.51		0.947	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Lead-212	0.00942	U	0.126	0.126		0.103	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Lead-214	0.303		0.0991	0.104		0.0817	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Potassium-40	7.63		1.25	1.47		0.287	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Protactinium-231	0.216	U	2.58	2.58		2.12	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Protactinium-234	0.0386	U	0.0614	0.0615		0.184	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Radium-226	0.0764	U	0.154	0.155	0.200	0.148	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Radium-228	0.411		0.185	0.190		0.127	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Thallium-208	0.161		0.0532	0.0557		0.0213	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Thorium 228	0.00942	U	0.126	0.126		0.103	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Thorium-232	0.411		0.185	0.190		0.127	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Thorium-234	-0.0504	U	0.985	0.985		0.812	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Uranium-235	-0.00941	U	0.227	0.227		0.187	pCi/g	11/06/20 18:15	11/29/20 15:26	1
Uranium-238	-0.0504	U	0.985	0.985		0.812	pCi/g	11/06/20 18:15	11/29/20 15:26	1

Client Sample ID: HPPG-F-026

Lab Sample ID: 160-40217-2

Date Collected: 10/29/20 14:57

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.569		0.306	0.312		0.129	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Actinium-227	0.000	U	0.387	0.387		0.393	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Bismuth-212	0.277	U	0.740	0.740		0.574	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Bismuth-214	0.434		0.156	0.163		0.0633	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Cesium-137	0.00867	U	0.0642	0.0642	0.0700	0.0515	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Lead-210	0.647	U	1.25	1.26		0.854	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Lead-212	0.479		0.104	0.121		0.0472	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Lead-214	0.425		0.129	0.136		0.0535	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Potassium-40	6.58		1.41	1.57		0.278	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Protactinium-231	0.000	U	0.634	0.634		2.02	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Protactinium-234	0.105	U	0.236	0.237		0.176	pCi/g	11/06/20 18:15	11/29/20 15:24	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-F-026

Lab Sample ID: 160-40217-2

Date Collected: 10/29/20 14:57

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.434		0.156	0.163	0.200	0.0633	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Radium-228	0.569		0.306	0.312		0.129	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Thallium-208	0.225		0.0722	0.0758		0.0203	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Thorium 228	0.479		0.104	0.121		0.0472	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Thorium-232	0.569		0.306	0.312		0.129	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Thorium-234	-0.711	U	0.717	0.721		0.824	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Uranium-235	0.0148	U	0.353	0.353		0.290	pCi/g	11/06/20 18:15	11/29/20 15:24	1
Uranium-238	-0.711	U	0.717	0.721		0.824	pCi/g	11/06/20 18:15	11/29/20 15:24	1

Client Sample ID: HPPG-SFU-TU098B-001

Lab Sample ID: 160-40217-3

Date Collected: 10/29/20 13:52

Matrix: Solid

Date Received: 11/02/20 08:50

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.0367	U	0.0488	0.0489	0.160	0.0435	pCi/g	11/25/20 14:30	12/11/20 07:07	1
<i>Carrier</i>	<i>%Yield</i>	<i>Qualifier</i>	<i>Limits</i>					<i>Prepared</i>	<i>Analyzed</i>	<i>Dil Fac</i>
<i>Sr Carrier</i>	96.8		40 - 110					11/25/20 14:30	12/11/20 07:07	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.304		0.210	0.213		0.0868	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Actinium-227	0.203	U	0.416	0.416		0.288	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Bismuth-212	0.307	U	0.908	0.908		0.720	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Bismuth-214	0.346		0.112	0.118		0.0427	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Cesium-137	-0.0671	U	0.103	0.103	0.0700	0.0805	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Lead-210	0.838	U	1.39	1.39		1.08	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Lead-212	0.375		0.103	0.114		0.0594	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Lead-214	0.499		0.152	0.161		0.0548	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Potassium-40	7.22		1.36	1.55		0.150	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Protactinium-231	-0.930	U	2.41	2.41		1.94	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Protactinium-234	0.0815	U	0.176	0.176		0.245	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Radium-226	0.346		0.112	0.118	0.200	0.0427	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Radium-228	0.304		0.210	0.213		0.0868	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Thallium-208	0.0795		0.104	0.105		0.0556	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Thorium 228	0.375		0.103	0.114		0.0594	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Thorium-232	0.304		0.210	0.213		0.0868	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Thorium-234	-0.582	U	0.813	0.816		0.807	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Uranium-235	0.0360	U	0.465	0.465		0.463	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Uranium-238	-0.582	U	0.813	0.816		0.807	pCi/g	11/06/20 18:15	11/29/20 15:21	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-002

Lab Sample ID: 160-40217-4

Date Collected: 10/29/20 13:56

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.328		0.198	0.201		0.0952	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Actinium-227	-0.154	U	0.535	0.536		0.353	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Bismuth-212	-0.400	U	0.776	0.777		0.608	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Bismuth-214	0.321		0.0993	0.105		0.0408	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Cesium-137	-0.0356	U	0.0622	0.0623	0.0700	0.0484	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Lead-210	0.504	U	1.15	1.15		0.771	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Lead-212	0.299		0.0820	0.0907		0.0477	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Lead-214	0.295		0.111	0.115		0.0638	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Potassium-40	6.14		1.15	1.31		0.332	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Protactinium-231	-0.732	U	2.52	2.52		2.05	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Protactinium-234	0.177	U	0.102	0.104		0.207	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Radium-226	0.321		0.0993	0.105	0.200	0.0408	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Radium-228	0.328		0.198	0.201		0.0952	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Thallium-208	0.125		0.0489	0.0506		0.0214	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Thorium 228	0.299		0.0820	0.0907		0.0477	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Thorium-232	0.328		0.198	0.201		0.0952	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Thorium-234	-0.326	U	0.823	0.824		0.687	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Uranium-235	0.00536	U	0.333	0.333		0.274	pCi/g	11/06/20 18:15	11/29/20 15:21	1
Uranium-238	-0.326	U	0.823	0.824		0.687	pCi/g	11/06/20 18:15	11/29/20 15:21	1

Client Sample ID: HPPG-SFU-TU098B-003

Lab Sample ID: 160-40217-5

Date Collected: 10/29/20 14:01

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.371		0.224	0.228		0.0997	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Actinium-227	0.113	U	0.386	0.386		0.376	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Bismuth-212	0.413	U	0.950	0.951		0.747	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Bismuth-214	0.108	U	0.200	0.201		0.198	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Cesium-137	0.0262	U	0.0565	0.0566	0.0700	0.0433	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Lead-210	0.778	U	1.56	1.56		1.02	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Lead-212	0.379		0.101	0.111		0.0566	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Lead-214	0.373		0.129	0.136		0.0580	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Potassium-40	7.10		1.34	1.56		0.285	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Protactinium-231	-1.01	U	3.40	3.40		2.77	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Protactinium-234	0.115	U	0.250	0.251		0.239	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Radium-226	0.108	U	0.200	0.201	0.200	0.198	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Radium-228	0.371		0.224	0.228		0.0997	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Thallium-208	0.201		0.0666	0.0705		0.0235	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Thorium 228	0.379		0.101	0.111		0.0566	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Thorium-232	0.371		0.224	0.228		0.0997	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Thorium-234	-0.336	U	0.959	0.959		0.799	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Uranium-235	-0.211	U	0.508	0.508		0.495	pCi/g	11/06/20 18:15	11/29/20 15:23	1
Uranium-238	-0.336	U	0.959	0.959		0.799	pCi/g	11/06/20 18:15	11/29/20 15:23	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-004

Lab Sample ID: 160-40217-6

Date Collected: 10/29/20 14:05

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.229		0.124	0.126		0.145	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Actinium-227	0.652		0.263	0.272		0.0868	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Bismuth-212	-0.639	U	1.04	1.04		0.807	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Bismuth-214	0.329		0.103	0.109		0.0350	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Cesium-137	0.0154	U	0.0427	0.0427	0.0700	0.0328	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Lead-210	1.24		1.23	1.24		0.801	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Lead-212	0.0217	U	0.110	0.110		0.0893	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Lead-214	0.467		0.126	0.134		0.0517	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Potassium-40	8.44		1.44	1.67		0.208	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Protactinium-231	0.000	U	0.793	0.793		2.05	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Protactinium-234	-0.0217	U	0.0555	0.0555		0.216	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Radium-226	0.329		0.103	0.109	0.200	0.0350	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Radium-228	0.229		0.124	0.126		0.145	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Thallium-208	0.167		0.0485	0.0514		0.00823	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Thorium 228	0.0217	U	0.110	0.110		0.0893	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Thorium-232	0.229		0.124	0.126		0.145	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Thorium-234	0.322	U	0.418	0.419		0.355	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Uranium-235	-0.00518	U	0.0120	0.0120		0.381	pCi/g	11/06/20 18:15	11/29/20 16:04	1
Uranium-238	0.322	U	0.418	0.419		0.355	pCi/g	11/06/20 18:15	11/29/20 16:04	1

Client Sample ID: HPPG-SFU-TU098B-005

Lab Sample ID: 160-40217-7

Date Collected: 10/29/20 14:08

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.311		0.226	0.228		0.115	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Actinium-227	0.0720	U	0.453	0.453		0.278	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Bismuth-212	0.00587	U	0.621	0.621		0.511	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Bismuth-214	0.0968	U	0.166	0.166		0.106	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Cesium-137	0.0250	U	0.0423	0.0424	0.0700	0.0319	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Lead-210	-0.592	U	1.44	1.44		1.20	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Lead-212	0.358		0.0814	0.0937		0.0420	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Lead-214	0.426		0.0826	0.0938		0.0354	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Potassium-40	6.04		1.06	1.23		0.259	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Protactinium-231	0.295	U	1.23	1.23		1.85	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Protactinium-234	-0.0194	U	0.0343	0.0343		0.176	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Radium-226	0.0968	U	0.166	0.166	0.200	0.106	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Radium-228	0.311		0.226	0.228		0.115	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Thallium-208	0.141		0.0471	0.0493		0.0194	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Thorium 228	0.358		0.0814	0.0937		0.0420	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Thorium-232	0.311		0.226	0.228		0.115	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Thorium-234	-0.643	U	0.846	0.849		0.710	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Uranium-235	0.0768	U	0.169	0.169		0.246	pCi/g	11/06/20 18:15	11/29/20 16:07	1
Uranium-238	-0.643	U	0.846	0.849		0.710	pCi/g	11/06/20 18:15	11/29/20 16:07	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-006

Lab Sample ID: 160-40217-8

Date Collected: 10/29/20 14:11

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.545		0.197	0.205		0.0402	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Actinium-227	0.116	U	0.369	0.369		0.293	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Bismuth-212	0.000	U	0.380	0.380		0.677	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Bismuth-214	0.253		0.121	0.124		0.0610	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Cesium-137	0.00474	U	0.0635	0.0635	0.0700	0.0391	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Lead-210	0.733		1.09	1.10		0.722	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Lead-212	0.426		0.0927	0.108		0.0379	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Lead-214	0.167		0.0730	0.0750		0.118	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Potassium-40	7.34		1.47	1.65		0.272	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Protactinium-231	0.328	U	1.34	1.34		2.13	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Protactinium-234	0.103	U	0.202	0.202		0.161	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Radium-226	0.253		0.121	0.124	0.200	0.0610	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Radium-228	0.545		0.197	0.205		0.0402	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Thallium-208	0.184		0.0631	0.0659		0.0187	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Thorium 228	0.426		0.0927	0.108		0.0379	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Thorium-232	0.545		0.197	0.205		0.0402	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Thorium-234	-0.493	U	0.495	0.498		0.753	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Uranium-235	0.00901	U	0.0373	0.0373		0.294	pCi/g	11/06/20 18:15	11/29/20 15:57	1
Uranium-238	-0.493	U	0.495	0.498		0.753	pCi/g	11/06/20 18:15	11/29/20 15:57	1

Client Sample ID: HPPG-SFU-TU098B-007

Lab Sample ID: 160-40217-9

Date Collected: 10/29/20 14:14

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.429		0.146	0.153		0.0945	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Actinium-227	0.0993	U	0.326	0.327		0.268	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Bismuth-212	0.234	U	0.388	0.389		0.289	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Bismuth-214	0.406		0.0973	0.106		0.0373	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Cesium-137	0.0229	U	0.0391	0.0392	0.0700	0.0298	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Lead-210	-0.658	U	1.42	1.42		1.15	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Lead-212	0.455		0.0742	0.0947		0.0301	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Lead-214	0.417		0.0827	0.0933		0.0373	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Potassium-40	7.81		1.06	1.33		0.0834	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Protactinium-231	0.000	U	0.281	0.281		1.65	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Protactinium-234	0.0642	U	0.187	0.187		0.190	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Radium-226	0.406		0.0973	0.106	0.200	0.0373	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Radium-228	0.429		0.146	0.153		0.0945	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Thallium-208	0.175		0.0466	0.0500		0.0137	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Thorium 228	0.455		0.0742	0.0947		0.0301	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Thorium-232	0.429		0.146	0.153		0.0945	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Thorium-234	-0.0629	U	0.128	0.129		0.845	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Uranium-235	-0.0254	U	0.0396	0.0397		0.324	pCi/g	11/06/20 18:15	11/29/20 15:53	1
Uranium-238	-0.0629	U	0.128	0.129		0.845	pCi/g	11/06/20 18:15	11/29/20 15:53	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-008

Lab Sample ID: 160-40217-10

Date Collected: 10/29/20 14:18

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.220		0.279	0.280		0.176	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Actinium-227	0.102	U	0.368	0.369		0.344	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Bismuth-212	0.000	U	0.329	0.329		0.563	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Bismuth-214	0.357		0.151	0.156		0.0677	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Cesium-137	-0.0349	U	0.0616	0.0617	0.0700	0.0470	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Lead-210	-1.25	U	1.76	1.77		1.42	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Lead-212	0.483		0.103	0.121		0.0521	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Lead-214	0.423		0.129	0.136		0.0590	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Potassium-40	8.85		1.47	1.73		0.143	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Protactinium-231	0.000	U	0.388	0.388		2.31	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Protactinium-234	-0.130	U	0.345	0.345		0.280	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Radium-226	0.357		0.151	0.156	0.200	0.0677	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Radium-228	0.220		0.279	0.280		0.176	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Thallium-208	0.160		0.0586	0.0609		0.0225	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Thorium 228	0.483		0.103	0.121		0.0521	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Thorium-232	0.220		0.279	0.280		0.176	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Thorium-234	-0.0734	U	0.887	0.887		0.729	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Uranium-235	0.211	U	0.416	0.416		0.427	pCi/g	11/06/20 18:15	11/29/20 15:54	1
Uranium-238	-0.0734	U	0.887	0.887		0.729	pCi/g	11/06/20 18:15	11/29/20 15:54	1

Client Sample ID: HPPG-SFU-TU098B-009

Lab Sample ID: 160-40217-11

Date Collected: 10/29/20 14:22

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.354		0.158	0.162		0.0778	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Actinium-227	-0.290	U	0.520	0.521		0.334	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Bismuth-212	0.962		0.437	0.448		0.139	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Bismuth-214	0.307		0.101	0.106		0.0422	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Cesium-137	0.00195	U	0.0538	0.0538	0.0700	0.0442	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Lead-210	-0.0954	U	1.35	1.35		1.11	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Lead-212	0.262		0.0796	0.0865		0.0478	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Lead-214	0.351		0.105	0.111		0.0473	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Potassium-40	5.09		0.986	1.12		0.257	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Protactinium-231	0.0863	U	0.317	0.317		1.87	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Protactinium-234	0.0767	U	0.244	0.245		0.199	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Radium-226	0.307		0.101	0.106	0.200	0.0422	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Radium-228	0.354		0.158	0.162		0.0778	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Thallium-208	0.149		0.0555	0.0577		0.0224	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Thorium 228	0.262		0.0796	0.0865		0.0478	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Thorium-232	0.354		0.158	0.162		0.0778	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Thorium-234	-0.706	U	0.741	0.745		0.571	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Uranium-235	0.0881	U	0.202	0.202		0.346	pCi/g	11/06/20 18:15	11/29/20 15:55	1
Uranium-238	-0.706	U	0.741	0.745		0.571	pCi/g	11/06/20 18:15	11/29/20 15:55	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-010

Lab Sample ID: 160-40217-12

Date Collected: 10/29/20 14:26

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.351		0.300	0.302		0.174	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Actinium-227	0.0472	U	0.129	0.129		0.531	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Bismuth-212	0.146	U	0.961	0.961		0.777	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Bismuth-214	0.680		0.160	0.178		0.0451	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Cesium-137	0.109		0.0586	0.0599	0.0700	0.0304	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Lead-210	1.24		1.56	1.57		1.07	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Lead-212	0.510		0.118	0.133		0.0602	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Lead-214	0.391		0.148	0.155		0.0681	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Potassium-40	7.76		1.51	1.76		0.334	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Protactinium-231	0.912	U	2.78	2.78		2.25	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Protactinium-234	0.204	U	0.0989	0.102		0.337	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Radium-226	0.680		0.160	0.178	0.200	0.0451	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Radium-228	0.351		0.300	0.302		0.174	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Thallium-208	0.208		0.0680	0.0721		0.0239	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Thorium 228	0.510		0.118	0.133		0.0602	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Thorium-232	0.351		0.300	0.302		0.174	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Thorium-234	0.860		0.714	0.722		0.540	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Uranium-235	-0.0136	U	0.798	0.798		0.593	pCi/g	11/06/20 18:15	11/29/20 16:27	1
Uranium-238	0.860		0.714	0.722		0.540	pCi/g	11/06/20 18:15	11/29/20 16:27	1

Client Sample ID: HPPG-SFU-TU098B-011

Lab Sample ID: 160-40217-13

Date Collected: 10/29/20 14:29

Matrix: Solid

Date Received: 11/02/20 08:50

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0517		0.0519	0.0520	0.160	0.0382	pCi/g	11/25/20 15:25	12/11/20 07:10	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	107		40 - 110					11/25/20 15:25	12/11/20 07:10	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.519		0.183	0.191		0.0659	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Actinium-227	0.100	U	0.392	0.392		0.351	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Bismuth-212	0.304	U	0.835	0.836		0.662	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Bismuth-214	0.370		0.151	0.156		0.0646	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Cesium-137	0.0226	U	0.0483	0.0484	0.0700	0.0370	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Lead-210	0.428	U	1.32	1.33		0.928	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Lead-212	0.351		0.0951	0.105		0.0541	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Lead-214	0.464		0.138	0.146		0.0634	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Potassium-40	6.36		1.20	1.37		0.308	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Protactinium-231	-0.838	U	3.00	3.00		2.44	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Protactinium-234	-0.108	U	0.330	0.330		0.269	pCi/g	11/06/20 18:15	11/29/20 16:35	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-011

Lab Sample ID: 160-40217-13

Date Collected: 10/29/20 14:29

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.370		0.151	0.156	0.200	0.0646	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Radium-228	0.519		0.183	0.191		0.0659	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Thallium-208	0.179		0.0694	0.0719		0.0269	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Thorium 228	0.351		0.0951	0.105		0.0541	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Thorium-232	0.519		0.183	0.191		0.0659	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Thorium-234	-1.13	U	0.856	0.865		0.974	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Uranium-235	-0.204	U	0.658	0.659		0.538	pCi/g	11/06/20 18:15	11/29/20 16:35	1
Uranium-238	-1.13	U	0.856	0.865		0.974	pCi/g	11/06/20 18:15	11/29/20 16:35	1

Client Sample ID: HPPG-SFU-TU098B-012

Lab Sample ID: 160-40217-14

Date Collected: 10/29/20 14:32

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.647		0.210	0.220		0.0379	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Actinium-227	0.197	U	0.448	0.448		0.374	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Bismuth-212	0.291	U	0.602	0.602		0.453	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Bismuth-214	0.490		0.191	0.198		0.0793	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Cesium-137	0.000	U	0.0120	0.0120	0.0700	0.0530	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Lead-210	-0.234	U	1.66	1.66		1.37	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Lead-212	0.419		0.110	0.122		0.0621	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Lead-214	0.475		0.119	0.129		0.0319	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Potassium-40	7.49		1.41	1.61		0.156	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Protactinium-231	0.915	U	2.67	2.67		2.16	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Protactinium-234	0.192	U	0.135	0.137		0.253	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Radium-226	0.490		0.191	0.198	0.200	0.0793	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Radium-228	0.647		0.210	0.220		0.0379	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Thallium-208	0.265		0.0799	0.0845		0.0268	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Thorium 228	0.419		0.110	0.122		0.0621	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Thorium-232	0.647		0.210	0.220		0.0379	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Thorium-234	0.320	U	0.529	0.530		0.463	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Uranium-235	-0.266	U	0.319	0.320		0.527	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Uranium-238	0.320	U	0.529	0.530		0.463	pCi/g	11/06/20 18:15	11/29/20 16:36	1

Client Sample ID: HPPG-SFU-TU098B-013

Lab Sample ID: 160-40217-15

Date Collected: 10/29/20 14:34

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.312		0.199	0.202		0.0879	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Actinium-227	-0.208	U	0.513	0.514		0.298	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Bismuth-212	0.251	U	0.447	0.448		0.338	pCi/g	11/06/20 18:15	11/29/20 16:36	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-013

Lab Sample ID: 160-40217-15

Date Collected: 10/29/20 14:34

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.310		0.0847	0.0906		0.0356	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Cesium-137	-0.0346	U	0.0651	0.0652	0.0700	0.0513	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Lead-210	0.546	U	1.00	1.00		0.792	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Lead-212	0.451		0.0790	0.0983		0.0350	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Lead-214	0.428		0.0909	0.101		0.0387	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Potassium-40	7.96		1.11	1.37		0.0896	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Protactinium-231	0.000	U	0.578	0.578		1.88	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Protactinium-234	-0.00953	U	0.0202	0.0203		0.210	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Radium-226	0.310		0.0847	0.0906	0.200	0.0356	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Radium-228	0.312		0.199	0.202		0.0879	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Thallium-208	0.166		0.0530	0.0558		0.0175	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Thorium 228	0.451		0.0790	0.0983		0.0350	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Thorium-232	0.312		0.199	0.202		0.0879	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Thorium-234	0.269	U	0.766	0.767		0.623	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Uranium-235	0.0852	U	0.157	0.158		0.367	pCi/g	11/06/20 18:15	11/29/20 16:36	1
Uranium-238	0.269	U	0.766	0.767		0.623	pCi/g	11/06/20 18:15	11/29/20 16:36	1

Client Sample ID: HPPG-SFU-TU098B-014

Lab Sample ID: 160-40217-16

Date Collected: 10/29/20 14:36

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.437		0.211	0.215		0.128	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Actinium-227	0.298	U	0.593	0.594		0.354	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Bismuth-212	0.294	U	0.797	0.798		0.628	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Bismuth-214	0.453		0.143	0.151		0.0629	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Cesium-137	0.00265	U	0.0592	0.0592	0.0700	0.0485	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Lead-210	0.721	U	1.70	1.70		1.16	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Lead-212	0.0506	U	0.138	0.138		0.112	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Lead-214	0.537		0.129	0.140		0.0690	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Potassium-40	7.56		1.29	1.50		0.129	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Protactinium-231	0.000	U	0.399	0.399		2.47	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Protactinium-234	-0.0419	U	0.134	0.134		0.314	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Radium-226	0.453		0.143	0.151	0.200	0.0629	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Radium-228	0.437		0.211	0.215		0.128	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Thallium-208	0.233		0.0574	0.0621		0.00823	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Thorium 228	0.0506	U	0.138	0.138		0.112	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Thorium-232	0.437		0.211	0.215		0.128	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Thorium-234	-0.614	U	0.723	0.726		1.43	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Uranium-235	0.422	U	0.304	0.307		0.456	pCi/g	11/06/20 18:15	11/29/20 16:37	1
Uranium-238	-0.614	U	0.723	0.726		1.43	pCi/g	11/06/20 18:15	11/29/20 16:37	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-015

Lab Sample ID: 160-40217-17

Date Collected: 10/29/20 14:38

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.504		0.135	0.144		0.0854	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Actinium-227	0.145	U	0.312	0.312		0.247	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Bismuth-212	0.000	U	0.525	0.525		0.541	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Bismuth-214	0.352		0.110	0.116		0.0436	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Cesium-137	-0.00846	U	0.0627	0.0628	0.0700	0.0511	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Lead-210	0.634	U	1.30	1.31		1.04	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Lead-212	0.505		0.0837	0.106		0.0344	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Lead-214	0.431		0.0860	0.0970		0.0465	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Potassium-40	6.75		1.09	1.29		0.263	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Protactinium-231	-0.833	U	2.68	2.68		2.18	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Protactinium-234	0.0790	U	0.165	0.165		0.197	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Radium-226	0.352		0.110	0.116	0.200	0.0436	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Radium-228	0.504		0.135	0.144		0.0854	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Thallium-208	0.164		0.0527	0.0554		0.0183	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Thorium 228	0.505		0.0837	0.106		0.0344	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Thorium-232	0.504		0.135	0.144		0.0854	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Thorium-234	-0.331	U	0.376	0.378		0.850	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Uranium-235	-0.154	U	0.410	0.411		0.333	pCi/g	11/06/20 18:15	11/29/20 16:39	1
Uranium-238	-0.331	U	0.376	0.378		0.850	pCi/g	11/06/20 18:15	11/29/20 16:39	1

Client Sample ID: HPPG-SFU-TU098B-016

Lab Sample ID: 160-40217-18

Date Collected: 10/29/20 14:41

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.492		0.176	0.184		0.0962	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Actinium-227	0.0885	U	0.379	0.379		0.370	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Bismuth-212	-0.123	U	0.917	0.917		0.742	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Bismuth-214	0.284		0.136	0.139		0.0691	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Cesium-137	0.0134	U	0.0961	0.0961	0.0700	0.0778	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Lead-210	1.54		1.40	1.41		0.788	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Lead-212	0.422		0.102	0.115		0.0489	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Lead-214	0.445		0.112	0.121		0.0628	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Potassium-40	8.36		1.61	1.82		0.288	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Protactinium-231	0.636	U	2.02	2.02		2.22	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Protactinium-234	0.0677	U	0.109	0.109		0.188	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Radium-226	0.284		0.136	0.139	0.200	0.0691	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Radium-228	0.492		0.176	0.184		0.0962	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Thallium-208	0.188		0.0752	0.0777		0.0285	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Thorium 228	0.422		0.102	0.115		0.0489	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Thorium-232	0.492		0.176	0.184		0.0962	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Thorium-234	0.436		0.440	0.443		0.372	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Uranium-235	-0.0400	U	0.0788	0.0789		0.304	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Uranium-238	0.436		0.440	0.443		0.372	pCi/g	11/06/20 18:15	11/29/20 16:40	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-017

Lab Sample ID: 160-40217-19

Date Collected: 10/29/20 14:42

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.456		0.180	0.186		0.0608	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Actinium-227	0.124	U	0.352	0.352		0.336	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Bismuth-212	-0.0417	U	0.726	0.726		0.595	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Bismuth-214	0.366		0.107	0.113		0.0398	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Cesium-137	0.0169	U	0.0528	0.0529	0.0700	0.0419	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Lead-210	0.642	U	1.12	1.12		0.772	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Lead-212	0.295		0.0768	0.0857		0.0412	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Lead-214	0.323		0.0975	0.103		0.0764	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Potassium-40	7.64		1.19	1.43		0.263	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Protactinium-231	0.000	U	0.890	0.890		1.96	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Protactinium-234	0.0490	U	0.0931	0.0932		0.149	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Radium-226	0.366		0.107	0.113	0.200	0.0398	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Radium-228	0.456		0.180	0.186		0.0608	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Thallium-208	0.0927		0.0913	0.0918		0.0405	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Thorium 228	0.295		0.0768	0.0857		0.0412	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Thorium-232	0.456		0.180	0.186		0.0608	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Thorium-234	-0.258	U	0.834	0.834		0.694	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Uranium-235	0.0876	U	0.265	0.265		0.213	pCi/g	11/06/20 18:15	11/29/20 16:40	1
Uranium-238	-0.258	U	0.834	0.834		0.694	pCi/g	11/06/20 18:15	11/29/20 16:40	1

Client Sample ID: HPPG-SFU-TU098B-018

Lab Sample ID: 160-40217-20

Date Collected: 10/29/20 14:44

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.444		0.121	0.129		0.0395	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Actinium-227	0.180	U	0.333	0.334		0.259	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Bismuth-212	0.000	U	0.154	0.154		0.421	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Bismuth-214	0.426		0.121	0.129		0.0452	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Cesium-137	0.0182	U	0.0418	0.0419	0.0700	0.0326	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Lead-210	0.569	U	1.06	1.07		0.843	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Lead-212	0.389		0.0799	0.0945		0.0411	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Lead-214	0.332		0.0861	0.0928		0.0433	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Potassium-40	7.58		1.37	1.58		0.456	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Protactinium-231	-0.729	U	2.23	2.23		1.81	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Protactinium-234	-0.0511	U	0.236	0.236		0.193	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Radium-226	0.426		0.121	0.129	0.200	0.0452	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Radium-228	0.444		0.121	0.129		0.0395	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Thallium-208	0.133		0.0570	0.0586		0.0250	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Thorium 228	0.389		0.0799	0.0945		0.0411	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Thorium-232	0.444		0.121	0.129		0.0395	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Thorium-234	-0.349	U	0.362	0.364		0.948	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Uranium-235	0.0182	U	0.211	0.211		0.333	pCi/g	11/06/20 18:15	11/29/20 15:19	1
Uranium-238	-0.349	U	0.362	0.364		0.948	pCi/g	11/06/20 18:15	11/29/20 15:19	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-019

Lab Sample ID: 160-40217-21

Date Collected: 10/29/20 14:46

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.607		0.182	0.195		0.0991	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Actinium-227	0.137	U	0.519	0.519		0.434	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Bismuth-212	0.400	U	0.757	0.759		0.575	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Bismuth-214	0.413		0.151	0.158		0.0643	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Cesium-137	-0.000545	U	0.0678	0.0678	0.0700	0.0391	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Lead-210	-0.801	U	1.96	1.96		1.65	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Lead-212	0.531		0.124	0.139		0.0681	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Lead-214	0.467		0.123	0.135		0.0653	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Potassium-40	7.97		1.49	1.75		0.318	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Protactinium-231	-1.29	U	3.65	3.66		2.97	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Protactinium-234	-0.134	U	0.407	0.407		0.331	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Radium-226	0.413		0.151	0.158	0.200	0.0643	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Radium-228	0.607		0.182	0.195		0.0991	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Thallium-208	0.212		0.0631	0.0676		0.0175	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Thorium 228	0.531		0.124	0.139		0.0681	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Thorium-232	0.607		0.182	0.195		0.0991	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Thorium-234	-0.595	U	0.833	0.836		1.08	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Uranium-235	-0.0373	U	0.0771	0.0772		0.554	pCi/g	11/06/20 19:32	11/29/20 14:07	1
Uranium-238	-0.595	U	0.833	0.836		1.08	pCi/g	11/06/20 19:32	11/29/20 14:07	1

Client Sample ID: HPPG-SFU-TU098B-020

Lab Sample ID: 160-40217-22

Date Collected: 10/29/20 14:46

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.564		0.141	0.152		0.0271	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Actinium-227	0.219	U	0.456	0.456		0.272	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Bismuth-212	0.0748	U	0.731	0.731		0.596	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Bismuth-214	0.0411	U	0.204	0.204		0.166	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Cesium-137	-0.0490	U	0.0844	0.0846	0.0700	0.0665	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Lead-210	0.324	U	1.12	1.12		0.817	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Lead-212	0.438		0.0881	0.105		0.0412	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Lead-214	0.438		0.0994	0.109		0.0428	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Potassium-40	7.84		1.24	1.48		0.278	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Protactinium-231	0.317	U	1.34	1.34		2.08	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Protactinium-234	0.0661	U	0.0981	0.0983		0.164	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Radium-226	0.0411	U	0.204	0.204	0.200	0.166	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Radium-228	0.564		0.141	0.152		0.0271	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Thallium-208	0.192		0.0615	0.0647		0.0249	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Thorium 228	0.438		0.0881	0.105		0.0412	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Thorium-232	0.564		0.141	0.152		0.0271	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Thorium-234	0.345	U	0.450	0.451		0.402	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Uranium-235	0.131	U	0.325	0.325		0.259	pCi/g	11/06/20 19:32	11/29/20 14:48	1
Uranium-238	0.345	U	0.450	0.451		0.402	pCi/g	11/06/20 19:32	11/29/20 14:48	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-021

Lab Sample ID: 160-40217-23

Date Collected: 10/29/20 14:48

Matrix: Solid

Date Received: 11/02/20 08:50

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.00492	U	0.0580	0.0580	0.160	0.0473	pCi/g	11/25/20 15:25	12/11/20 08:10	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	99.1		40 - 110					11/25/20 15:25	12/11/20 08:10	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.467		0.201	0.206		0.0482	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Actinium-227	0.0723	U	0.164	0.164		0.479	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Bismuth-212	0.325	U	1.02	1.03		0.809	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Bismuth-214	0.417		0.163	0.168		0.0710	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Cesium-137	0.0113	U	0.0731	0.0731	0.0700	0.0584	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Lead-210	0.939		1.32	1.32		0.865	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Lead-212	0.451		0.107	0.122		0.0469	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Lead-214	0.450		0.141	0.148		0.0596	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Potassium-40	8.64		1.75	1.96		0.326	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Protactinium-231	0.790	U	2.02	2.02		2.22	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Protactinium-234	-0.105	U	0.117	0.117		0.218	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Radium-226	0.417		0.163	0.168	0.200	0.0710	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Radium-228	0.467		0.201	0.206		0.0482	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Thallium-208	0.124		0.0995	0.100		0.0518	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Thorium 228	0.451		0.107	0.122		0.0469	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Thorium-232	0.467		0.201	0.206		0.0482	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Thorium-234	0.507		0.554	0.557		0.474	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Uranium-235	0.138	U	0.339	0.340		0.347	pCi/g	11/06/20 19:32	11/29/20 14:39	1
Uranium-238	0.507		0.554	0.557		0.474	pCi/g	11/06/20 19:32	11/29/20 14:39	1

Client Sample ID: HPPG-SFU-TU098B-022

Lab Sample ID: 160-40217-24

Date Collected: 10/29/20 14:50

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.642		0.192	0.203		0.0330	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Actinium-227	-0.365	U	0.717	0.718		0.432	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Bismuth-212	-0.323	U	0.929	0.929		0.738	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Bismuth-214	0.255		0.109	0.112		0.123	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Cesium-137	-0.0306	U	0.0932	0.0933	0.0700	0.0747	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Lead-210	1.27		1.55	1.56		1.05	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Lead-212	0.549		0.109	0.123		0.0526	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Lead-214	0.636		0.159	0.171		0.0603	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Potassium-40	8.51		1.37	1.61		0.128	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Protactinium-231	-0.843	U	3.09	3.09		2.52	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Protactinium-234	0.0659	U	0.320	0.320		0.274	pCi/g	11/06/20 19:32	11/29/20 14:41	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-022

Lab Sample ID: 160-40217-24

Date Collected: 10/29/20 14:50

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.255		0.109	0.112	0.200	0.123	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Radium-228	0.642		0.192	0.203		0.0330	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Thallium-208	0.258		0.0914	0.0951		0.0322	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Thorium 228	0.549		0.109	0.123		0.0526	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Thorium-232	0.642		0.192	0.203		0.0330	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Thorium-234	-0.734	U	0.721	0.726		0.984	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Uranium-235	-0.180	U	0.561	0.561		0.456	pCi/g	11/06/20 19:32	11/29/20 14:41	1
Uranium-238	-0.734	U	0.721	0.726		0.984	pCi/g	11/06/20 19:32	11/29/20 14:41	1

Client Sample ID: HPPG-SFU-TU098B-023

Lab Sample ID: 160-40217-25

Date Collected: 10/29/20 14:53

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.343		0.138	0.143		0.0826	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Actinium-227	-0.283	U	0.542	0.543		0.313	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Bismuth-212	-0.409	U	0.713	0.714		0.559	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Bismuth-214	0.260		0.0926	0.0964		0.0447	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Cesium-137	0.00244	U	0.0462	0.0462	0.0700	0.0379	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Lead-210	0.528	U	1.15	1.15		0.920	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Lead-212	0.437		0.0719	0.0915		0.0277	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Lead-214	0.396		0.0762	0.0866		0.0258	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Potassium-40	5.20		0.867	1.02		0.0842	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Protactinium-231	0.470	U	1.37	1.37		1.50	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Protactinium-234	0.0534	U	0.0689	0.0691		0.198	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Radium-226	0.260		0.0926	0.0964	0.200	0.0447	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Radium-228	0.343		0.138	0.143		0.0826	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Thallium-208	0.170		0.0465	0.0498		0.0119	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Thorium 228	0.437		0.0719	0.0915		0.0277	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Thorium-232	0.343		0.138	0.143		0.0826	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Thorium-234	0.199	U	0.429	0.430		0.290	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Uranium-235	0.130	U	0.234	0.234		0.363	pCi/g	11/06/20 19:32	11/29/20 14:43	1
Uranium-238	0.199	U	0.429	0.430		0.290	pCi/g	11/06/20 19:32	11/29/20 14:43	1

Client Sample ID: HPPG-SFU-TU098B-024

Lab Sample ID: 160-40217-26

Date Collected: 10/29/20 14:54

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.293		0.123	0.127		0.132	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Actinium-227	-0.268	U	0.759	0.760		0.462	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Bismuth-212	0.459	U	0.800	0.802		0.609	pCi/g	11/06/20 19:32	11/29/20 14:45	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Client Sample ID: HPPG-SFU-TU098B-024

Lab Sample ID: 160-40217-26

Date Collected: 10/29/20 14:54

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.376		0.159	0.165		0.0733	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Cesium-137	0.00159	U	0.0592	0.0592	0.0700	0.0485	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Lead-210	0.965	U	1.49	1.50		1.01	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Lead-212	0.443		0.107	0.119		0.0561	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Lead-214	0.383		0.144	0.151		0.0684	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Potassium-40	7.54		1.41	1.65		0.298	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Protactinium-231	0.412	U	1.83	1.83		2.00	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Protactinium-234	0.0441	U	0.0783	0.0785		0.291	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Radium-226	0.376		0.159	0.165	0.200	0.0733	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Radium-228	0.293		0.123	0.127		0.132	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Thallium-208	0.187		0.0739	0.0770		0.0315	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Thorium 228	0.443		0.107	0.119		0.0561	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Thorium-232	0.293		0.123	0.127		0.132	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Thorium-234	-0.878	U	0.941	0.947		0.945	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Uranium-235	0.0688	U	0.153	0.153		0.392	pCi/g	11/06/20 19:32	11/29/20 14:45	1
Uranium-238	-0.878	U	0.941	0.947		0.945	pCi/g	11/06/20 19:32	11/29/20 14:45	1

Client Sample ID: HPPG-SFU-TU098B-025

Lab Sample ID: 160-40217-27

Date Collected: 10/29/20 14:57

Matrix: Solid

Date Received: 11/02/20 08:50

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.555		0.167	0.176		0.0403	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Actinium-227	0.285	U	0.507	0.508		0.341	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Bismuth-212	-0.472	U	1.00	1.01		0.784	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Bismuth-214	0.422		0.120	0.128		0.0328	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Cesium-137	-0.0247	U	0.0605	0.0605	0.0700	0.0449	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Lead-210	1.28		1.64	1.65		1.08	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Lead-212	0.517		0.106	0.119		0.0519	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Lead-214	0.432		0.135	0.142		0.0547	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Potassium-40	8.03		1.54	1.74		0.250	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Protactinium-231	-0.912	U	3.17	3.17		2.58	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Protactinium-234	0.112	U	0.296	0.296		0.214	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Radium-226	0.422		0.120	0.128	0.200	0.0328	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Radium-228	0.555		0.167	0.176		0.0403	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Thallium-208	0.214		0.0773	0.0803		0.0279	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Thorium 228	0.517		0.106	0.119		0.0519	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Thorium-232	0.555		0.167	0.176		0.0403	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Thorium-234	0.510		0.562	0.564		0.503	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Uranium-235	-0.0478	U	0.338	0.338		0.400	pCi/g	11/06/20 19:32	11/29/20 15:18	1
Uranium-238	0.510		0.562	0.564		0.503	pCi/g	11/06/20 19:32	11/29/20 15:18	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-490265/23-A
Matrix: Solid
Analysis Batch: 491588

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490265

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	MB Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.02016	U	0.0539	0.0539	0.160	0.0460	pCi/g	11/25/20 14:30	12/11/20 07:07	1
Carrier	MB		Limits							
%Yield	MB Qualifier			Prepared	Analyzed	Dil Fac				
Sr Carrier	96.3		40 - 110	11/25/20 14:30	12/11/20 07:07	1				

Lab Sample ID: LCS 160-490265/1-A
Matrix: Solid
Analysis Batch: 491444

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490265

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.76	6.013		0.491	0.160	0.0470	pCi/g	77	75 - 125
Carrier	LCS		Limits						
%Yield	LCS Qualifier			Prepared	Analyzed	Dil Fac			
Sr Carrier	109		40 - 110						

Lab Sample ID: MB 160-490272/10-B
Matrix: Solid
Analysis Batch: 491589

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490272

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	MB Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.02855	U	0.0589	0.0589	0.160	0.0506	pCi/g	11/25/20 15:25	12/11/20 08:11	1
Carrier	MB		Limits							
%Yield	MB Qualifier			Prepared	Analyzed	Dil Fac				
Sr Carrier	99.4		40 - 110	11/25/20 15:25	12/11/20 08:11	1				

Lab Sample ID: LCS 160-490272/1-A
Matrix: Solid
Analysis Batch: 491588

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490272

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.76	6.091		0.497	0.160	0.0387	pCi/g	78	75 - 125
Carrier	LCS		Limits						
%Yield	LCS Qualifier			Prepared	Analyzed	Dil Fac			
Sr Carrier	106		40 - 110						

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Method: 905.0 - Total Beta Strontium (GFPC) (Continued)

Lab Sample ID: 160-40217-13 DU
Matrix: Solid
Analysis Batch: 491589

Client Sample ID: HPPG-SFU-TU098B-011
Prep Type: Total/NA
Prep Batch: 490272

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)						
Total Beta Strontium	0.0517		0.006533	U	0.0547	0.160	0.0445	pCi/g		0.42	1

Carrier	DU %Yield	DU Qualifier	Limits
Sr Carrier	107		40 - 110

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488491/1-A
Matrix: Solid
Analysis Batch: 490469

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488491

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	-0.06306	U	0.102	0.103		0.140	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Actinium-227	0.08022	U	0.174	0.174		0.273	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Bismuth-212	-0.2634	U	0.741	0.741		0.586	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Bismuth-214	-0.09586	U	0.0828	0.0834		0.107	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Cesium-137	0.0000	U	0.00669	0.00669	0.0700	0.0258	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Lead-210	0.4000	U	0.906	0.907		0.711	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Lead-212	-0.01314	U	0.0721	0.0721		0.0600	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Lead-214	-0.0001236	U	0.0765	0.0765		0.0621	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Potassium-40	0.1543	U	0.439	0.440		0.324	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Protactinium-231	0.0000	U	0.357	0.357		1.35	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Protactinium-234	0.08717	U	0.149	0.149		0.122	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Radium-226	-0.09586	U	0.0828	0.0834	0.200	0.107	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Radium-228	-0.06306	U	0.102	0.103		0.140	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Thallium-208	0.01082	U	0.0325	0.0325		0.0179	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Thorium 228	-0.01314	U	0.0721	0.0721		0.0600	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Thorium-232	-0.06306	U	0.102	0.103		0.140	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Thorium-234	0.09568	U	0.238	0.238		0.506	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Uranium-235	0.1032	U	0.213	0.213		0.226	pCi/g	11/06/20 18:15	11/29/20 15:51	1
Uranium-238	0.09568	U	0.238	0.238		0.506	pCi/g	11/06/20 18:15	11/29/20 15:51	1

Lab Sample ID: LCS 160-488491/2-A
Matrix: Solid
Analysis Batch: 490472

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488491

Analyte	Spike Added	LCS	LCS	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
		Result	Qual	Uncert. (2σ+/-)					
Americium-241	96.4	101.6		10.6		0.434	pCi/g	105	87 - 116
Cesium-137	26.7	24.99		2.66	0.0700	0.100	pCi/g	93	87 - 120
Cobalt-60	9.51	9.107		0.958		0.0551	pCi/g	96	87 - 115

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: 160-40217-20 DU
Matrix: Solid
Analysis Batch: 490471

Client Sample ID: HPPG-SFU-TU098B-018
Prep Type: Total/NA
Prep Batch: 488491

Analyte	Sample	Sample	DU	DU	Total	LOQ	DLC	Unit	RER	RER	Limit
	Result	Qual	Result	Qual	Uncert. (2σ+/-)						
Actinium 228	0.444		0.4339		0.197		0.100	pCi/g	0.03		1
Actinium-227	0.180	U	-0.3416	U	0.653		0.391	pCi/g	0.53		1
Bismuth-212	0.000	U	0.7989		0.385		0.103	pCi/g	1.48		1
Bismuth-214	0.426		0.4747		0.211		0.0851	pCi/g	0.14		1
Cesium-137	0.0182	U	-0.03296	U	0.0677	0.0700	0.0526	pCi/g	0.47		1
Lead-210	0.569	U	1.272		1.50		0.992	pCi/g	0.27		1
Lead-212	0.389		0.4700		0.107		0.0434	pCi/g	0.40		1
Lead-214	0.332		0.4481		0.123		0.0694	pCi/g	0.54		1
Potassium-40	7.58		6.434		1.60		0.426	pCi/g	0.36		1
Protactinium-231	-0.729	U	-0.9130	U	3.14		2.56	pCi/g	0.03		1
Protactinium-234	-0.0511	U	-0.1148	U	0.348		0.283	pCi/g	0.11		1
Radium-226	0.426		0.4747		0.211	0.200	0.0851	pCi/g	0.14		1
Radium-228	0.444		0.4339		0.197		0.100	pCi/g	0.03		1
Thallium-208	0.133		0.1878		0.0721		0.0249	pCi/g	0.42		1
Thorium 228	0.389		0.4700		0.107		0.0434	pCi/g	0.40		1
Thorium-232	0.444		0.4339		0.197		0.100	pCi/g	0.03		1
Thorium-234	-0.349	U	0.4530	U	0.550		0.496	pCi/g	0.88		1
Uranium-235	0.0182	U	0.1711	U	0.283		0.222	pCi/g	0.31		1
Uranium-238	-0.349	U	0.4530	U	0.550		0.496	pCi/g	0.88		1

Lab Sample ID: MB 160-488492/1-A
Matrix: Solid
Analysis Batch: 490476

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488492

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.01626	U	0.0459	0.0459		0.137	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Actinium-227	-0.01301	U	0.0606	0.0606		0.351	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Bismuth-212	0.3809	U	0.888	0.889		0.695	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Bismuth-214	-0.006734	U	0.00897	0.00899		0.200	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Cesium-137	-0.03088	U	0.0639	0.0640	0.0700	0.0492	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Lead-210	0.3962	U	1.59	1.59		1.26	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Lead-212	0.002141	U	0.103	0.103		0.0845	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Lead-214	-0.009276	U	0.0382	0.0382		0.106	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Potassium-40	0.1423	U	0.494	0.494		0.369	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Protactinium-231	0.3230	U	1.20	1.20		1.88	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Protactinium-234	-0.08694	U	0.278	0.278		0.225	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Radium-226	-0.006734	U	0.00897	0.00899	0.200	0.200	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Radium-228	0.01626	U	0.0459	0.0459		0.137	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Thallium-208	0.006815	U	0.00678	0.00682		0.0456	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Thorium 228	0.002141	U	0.103	0.103		0.0845	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Thorium-232	0.01626	U	0.0459	0.0459		0.137	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Thorium-234	0.06867	U	0.555	0.555		0.412	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Uranium-235	0.1572	U	0.325	0.326		0.353	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Uranium-238	0.06867	U	0.555	0.555		0.412	pCi/g	11/06/20 19:32	11/29/20 14:44	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488492/2-A
 Matrix: Solid
 Analysis Batch: 490621

Client Sample ID: Lab Control Sample
 Prep Type: Total/NA
 Prep Batch: 488492

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec.
									Limits
Americium-241	96.4	93.86		9.84		0.491	pCi/g	97	87 - 116
Cesium-137	26.7	25.46		2.71	0.0700	0.0750	pCi/g	95	87 - 120
Cobalt-60	9.51	9.160		0.960		0.0395	pCi/g	96	87 - 115



QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Rad

Leach Batch: 488198

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40217-1	HPPG-F-025	Total/NA	Solid	Dry and Grind	
160-40217-2	HPPG-F-026	Total/NA	Solid	Dry and Grind	
160-40217-3	HPPG-SFU-TU098B-001	Total/NA	Solid	Dry and Grind	
160-40217-4	HPPG-SFU-TU098B-002	Total/NA	Solid	Dry and Grind	
160-40217-5	HPPG-SFU-TU098B-003	Total/NA	Solid	Dry and Grind	
160-40217-6	HPPG-SFU-TU098B-004	Total/NA	Solid	Dry and Grind	
160-40217-7	HPPG-SFU-TU098B-005	Total/NA	Solid	Dry and Grind	
160-40217-8	HPPG-SFU-TU098B-006	Total/NA	Solid	Dry and Grind	
160-40217-9	HPPG-SFU-TU098B-007	Total/NA	Solid	Dry and Grind	
160-40217-10	HPPG-SFU-TU098B-008	Total/NA	Solid	Dry and Grind	
160-40217-11	HPPG-SFU-TU098B-009	Total/NA	Solid	Dry and Grind	

Leach Batch: 488207

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40217-12	HPPG-SFU-TU098B-010	Total/NA	Solid	Dry and Grind	
160-40217-13	HPPG-SFU-TU098B-011	Total/NA	Solid	Dry and Grind	
160-40217-14	HPPG-SFU-TU098B-012	Total/NA	Solid	Dry and Grind	
160-40217-15	HPPG-SFU-TU098B-013	Total/NA	Solid	Dry and Grind	
160-40217-16	HPPG-SFU-TU098B-014	Total/NA	Solid	Dry and Grind	
160-40217-17	HPPG-SFU-TU098B-015	Total/NA	Solid	Dry and Grind	
160-40217-18	HPPG-SFU-TU098B-016	Total/NA	Solid	Dry and Grind	
160-40217-19	HPPG-SFU-TU098B-017	Total/NA	Solid	Dry and Grind	
160-40217-20	HPPG-SFU-TU098B-018	Total/NA	Solid	Dry and Grind	
160-40217-21	HPPG-SFU-TU098B-019	Total/NA	Solid	Dry and Grind	
160-40217-22	HPPG-SFU-TU098B-020	Total/NA	Solid	Dry and Grind	
160-40217-23	HPPG-SFU-TU098B-021	Total/NA	Solid	Dry and Grind	
160-40217-24	HPPG-SFU-TU098B-022	Total/NA	Solid	Dry and Grind	
160-40217-25	HPPG-SFU-TU098B-023	Total/NA	Solid	Dry and Grind	
160-40217-26	HPPG-SFU-TU098B-024	Total/NA	Solid	Dry and Grind	
160-40217-27	HPPG-SFU-TU098B-025	Total/NA	Solid	Dry and Grind	
160-40217-13 DU	HPPG-SFU-TU098B-011	Total/NA	Solid	Dry and Grind	
160-40217-20 DU	HPPG-SFU-TU098B-018	Total/NA	Solid	Dry and Grind	

Prep Batch: 488491

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40217-1	HPPG-F-025	Total/NA	Solid	Fill_Geo-21	488198
160-40217-2	HPPG-F-026	Total/NA	Solid	Fill_Geo-21	488198
160-40217-3	HPPG-SFU-TU098B-001	Total/NA	Solid	Fill_Geo-21	488198
160-40217-4	HPPG-SFU-TU098B-002	Total/NA	Solid	Fill_Geo-21	488198
160-40217-5	HPPG-SFU-TU098B-003	Total/NA	Solid	Fill_Geo-21	488198
160-40217-6	HPPG-SFU-TU098B-004	Total/NA	Solid	Fill_Geo-21	488198
160-40217-7	HPPG-SFU-TU098B-005	Total/NA	Solid	Fill_Geo-21	488198
160-40217-8	HPPG-SFU-TU098B-006	Total/NA	Solid	Fill_Geo-21	488198
160-40217-9	HPPG-SFU-TU098B-007	Total/NA	Solid	Fill_Geo-21	488198
160-40217-10	HPPG-SFU-TU098B-008	Total/NA	Solid	Fill_Geo-21	488198
160-40217-11	HPPG-SFU-TU098B-009	Total/NA	Solid	Fill_Geo-21	488198
160-40217-12	HPPG-SFU-TU098B-010	Total/NA	Solid	Fill_Geo-21	488207
160-40217-13	HPPG-SFU-TU098B-011	Total/NA	Solid	Fill_Geo-21	488207
160-40217-14	HPPG-SFU-TU098B-012	Total/NA	Solid	Fill_Geo-21	488207
160-40217-15	HPPG-SFU-TU098B-013	Total/NA	Solid	Fill_Geo-21	488207
160-40217-16	HPPG-SFU-TU098B-014	Total/NA	Solid	Fill_Geo-21	488207

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
 SDG: GJ46599774

Rad (Continued)

Prep Batch: 488491 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40217-17	HPPG-SFU-TU098B-015	Total/NA	Solid	Fill_Geo-21	488207
160-40217-18	HPPG-SFU-TU098B-016	Total/NA	Solid	Fill_Geo-21	488207
160-40217-19	HPPG-SFU-TU098B-017	Total/NA	Solid	Fill_Geo-21	488207
160-40217-20	HPPG-SFU-TU098B-018	Total/NA	Solid	Fill_Geo-21	488207
MB 160-488491/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488491/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40217-20 DU	HPPG-SFU-TU098B-018	Total/NA	Solid	Fill_Geo-21	488207

Prep Batch: 488492

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40217-21	HPPG-SFU-TU098B-019	Total/NA	Solid	Fill_Geo-21	488207
160-40217-22	HPPG-SFU-TU098B-020	Total/NA	Solid	Fill_Geo-21	488207
160-40217-23	HPPG-SFU-TU098B-021	Total/NA	Solid	Fill_Geo-21	488207
160-40217-24	HPPG-SFU-TU098B-022	Total/NA	Solid	Fill_Geo-21	488207
160-40217-25	HPPG-SFU-TU098B-023	Total/NA	Solid	Fill_Geo-21	488207
160-40217-26	HPPG-SFU-TU098B-024	Total/NA	Solid	Fill_Geo-21	488207
160-40217-27	HPPG-SFU-TU098B-025	Total/NA	Solid	Fill_Geo-21	488207
MB 160-488492/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488492/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 490265

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40217-1	HPPG-F-025	Total/NA	Solid	DPS-0	488198
160-40217-3	HPPG-SFU-TU098B-001	Total/NA	Solid	DPS-0	488198
MB 160-490265/23-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-490265/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Prep Batch: 490272

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40217-13	HPPG-SFU-TU098B-011	Total/NA	Solid	DPS-0	488207
160-40217-23	HPPG-SFU-TU098B-021	Total/NA	Solid	DPS-0	488207
MB 160-490272/10-B	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-490272/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	
160-40217-13 DU	HPPG-SFU-TU098B-011	Total/NA	Solid	DPS-0	488207

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40217-1
SDG: GJ46599774

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)
160-40217-1	HPPG-F-025	105
160-40217-3	HPPG-SFU-TU098B-001	96.8
160-40217-13	HPPG-SFU-TU098B-011	107
160-40217-13 DU	HPPG-SFU-TU098B-011	107
160-40217-23	HPPG-SFU-TU098B-021	99.1
LCS 160-490265/1-A	Lab Control Sample	109
LCS 160-490272/1-A	Lab Control Sample	106
MB 160-490265/23-A	Method Blank	96.3
MB 160-490272/10-B	Method Blank	99.4

Tracer/Carrier Legend

Sr = Sr Carrier



Environment Testing
America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40219-1
Laboratory Sample Delivery Group: D11589464
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/8/2021 12:35:52 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	5
Receipt Checklists	7
Definitions/Glossary	8
Method Summary	9
Sample Summary	10
Client Sample Results	11
QC Sample Results	12
QC Association Summary	14
Tracer Carrier Summary	15

Case Narrative

Page 76 of 88

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
SDG: D11589464

Job ID: 160-40219-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40219-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
 SDG: D11589464

Job ID: 160-40219-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 11/02/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.9 C.

TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-SFU-TU098B-B-001 (160-40219-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 11/04/2020, prepared on 11/25/2020 and analyzed on 12/11/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-SFU-TU098B-B-001 (160-40219-1).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-SFU-TU098B-B-001 (160-40219-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/04/2020, prepared on 11/06/2020 and analyzed on 11/29/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.





CHAIN OF CUSTODY

Ref. Document # 501197RSY-024

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s):

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/30/2020
Waybill Number: 4957 0225 4307
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046
Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Analysis Requested							Dose Rate uR/Hr	Evidence Bag ID	Comment	
	Date	Time	Method			Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)									
HPPG-SFU-TU098B-B-001	10/30/2020	13:16	G	SO	1	16 oz. plastic jar	X		X					5	D1189464	

Special Instructions: Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g
21 day ingrowth results only

Turanaround Time: 3-day 10-Day 28-day Other **Level of QC Required:** I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water ; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air ; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/30/2020 15:43	SHIPPEDTOLAB	FED EX	

FED EX *** Last 3 transfers shown above - Complete list of transfers on last page ***

Micha Korrinhyzer
MICHA KORRINHYZER
NOV 2 2020
08:50



160-40219 Chain of Custody

Page 5 of 15

4/8/2021 (Rev. 1)



pl.

All Transfers for COC 501197RSY-024

Page 2 of 2

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/30/2020 15:43	SHIPPEDTOLAB	FED EX	

FED EX

Micha Korrinhizer
 MICHA KORRINHIZER NOV 02 2020 08:50



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40219-1

SDG Number: D11589464

Login Number: 40219**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Hoerchler, Elizabeth M**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
SDG: D11589464

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
SDG: D11589464

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
SDG: D11589464

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40219-1	HPPG-SFU-TU098B-B-001	Solid	10/30/20 13:16	11/02/20 08:50	

- 1
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10
- 11
- 12

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
 SDG: D11589464

Client Sample ID: HPPG-SFU-TU098B-B-001

Lab Sample ID: 160-40219-1

Date Collected: 10/30/20 13:16

Matrix: Solid

Date Received: 11/02/20 08:50

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0194	U	0.0576	0.0576	0.160	0.0488	pCi/g	11/25/20 15:25	12/11/20 08:10	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	106		40 - 110					11/25/20 15:25	12/11/20 08:10	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.631		0.165	0.177		0.0440	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Actinium-227	-0.215	U	0.655	0.655		0.382	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Bismuth-212	0.257	U	0.667	0.668		0.527	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Bismuth-214	0.550		0.123	0.135		0.0433	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Cesium-137	0.00289	U	0.0575	0.0575	0.0700	0.0472	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Lead-210	0.632	U	1.40	1.40		1.12	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Lead-212	0.558		0.0909	0.116		0.0374	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Lead-214	0.434		0.102	0.111		0.0542	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Potassium-40	7.94		1.22	1.46		0.281	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Protactinium-231	0.000	U	0.338	0.338		2.09	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Protactinium-234	-0.105	U	0.294	0.294		0.239	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Radium-226	0.550		0.123	0.135	0.200	0.0433	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Radium-228	0.631		0.165	0.177		0.0440	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Thallium-208	0.172		0.0779	0.0799		0.0362	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Thorium 228	0.558		0.0909	0.116		0.0374	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Thorium-232	0.631		0.165	0.177		0.0440	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Thorium-234	-0.389	U	0.445	0.448		1.04	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Uranium-235	0.214	U	0.205	0.206		0.428	pCi/g	11/06/20 19:32	11/29/20 14:40	1
Uranium-238	-0.389	U	0.445	0.448		1.04	pCi/g	11/06/20 19:32	11/29/20 14:40	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
 SDG: D11589464

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-490272/10-B
Matrix: Solid
Analysis Batch: 491589

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490272

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.02855	U	0.0589	0.0589	0.160	0.0506	pCi/g	11/25/20 15:25	12/11/20 08:11	1
Carrier	MB	MB	Limits				Prepared		Analyzed	
Sr Carrier	%Yield	Qualifier	40 - 110				11/25/20 15:25		12/11/20 08:11	
	99.4									

Lab Sample ID: LCS 160-490272/1-A
Matrix: Solid
Analysis Batch: 491588

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490272

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.76	6.091		0.497	0.160	0.0387	pCi/g	78	75 - 125	
Carrier	LCS	LCS	Limits							
Sr Carrier	%Yield	Qualifier	40 - 110							
	106									

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488492/1-A
Matrix: Solid
Analysis Batch: 490476

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488492

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-228	0.01626	U	0.0459	0.0459		0.137	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Actinium-227	-0.01301	U	0.0606	0.0606		0.351	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Bismuth-212	0.3809	U	0.888	0.889		0.695	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Bismuth-214	-0.006734	U	0.00897	0.00899		0.200	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Cesium-137	-0.03088	U	0.0639	0.0640	0.0700	0.0492	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Lead-210	0.3962	U	1.59	1.59		1.26	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Lead-212	0.002141	U	0.103	0.103		0.0845	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Lead-214	-0.009276	U	0.0382	0.0382		0.106	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Potassium-40	0.1423	U	0.494	0.494		0.369	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Protactinium-231	0.3230	U	1.20	1.20		1.88	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Protactinium-234	-0.08694	U	0.278	0.278		0.225	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Radium-226	-0.006734	U	0.00897	0.00899	0.200	0.200	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Radium-228	0.01626	U	0.0459	0.0459		0.137	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Thallium-208	0.006815	U	0.00678	0.00682		0.0456	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Thorium-228	0.002141	U	0.103	0.103		0.0845	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Thorium-232	0.01626	U	0.0459	0.0459		0.137	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Thorium-234	0.06867	U	0.555	0.555		0.412	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Uranium-235	0.1572	U	0.325	0.326		0.353	pCi/g	11/06/20 19:32	11/29/20 14:44	1
Uranium-238	0.06867	U	0.555	0.555		0.412	pCi/g	11/06/20 19:32	11/29/20 14:44	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
 SDG: D11589464

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488492/2-A
Matrix: Solid
Analysis Batch: 490621

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488492

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	93.86		9.84		0.491	pCi/g	97	87 - 116	
Cesium-137	26.7	25.46		2.71	0.0700	0.0750	pCi/g	95	87 - 120	
Cobalt-60	9.51	9.160		0.960		0.0395	pCi/g	96	87 - 115	

Lab Sample ID: 160-40219-1 DU
Matrix: Solid
Analysis Batch: 490471

Client Sample ID: HPPG-SFU-TU098B-B-001
Prep Type: Total/NA
Prep Batch: 488492

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium 228	0.631		0.4877		0.176		0.134	pCi/g	0.41	1
Actinium-227	-0.215	U	0.3144	U	0.526		0.321	pCi/g	0.45	1
Bismuth-212	0.257	U	-0.3402	U	1.06		0.847	pCi/g	0.35	1
Bismuth-214	0.550		0.4330		0.155		0.0790	pCi/g	0.40	1
Cesium-137	0.00289	U	-0.05512	U	0.0899	0.0700	0.0697	pCi/g	0.39	1
Lead-210	0.632	U	-1.013	U	2.00		1.68	pCi/g	0.48	1
Lead-212	0.558		0.5703		0.122		0.0450	pCi/g	0.05	1
Lead-214	0.434		0.6093		0.156		0.0553	pCi/g	0.66	1
Potassium-40	7.94		9.122		1.72		0.135	pCi/g	0.37	1
Protactinium-231	0.000	U	-1.165	U	3.78		3.08	pCi/g	0.28	1
Protactinium-234	-0.105	U	-0.1171	U	0.355		0.289	pCi/g	0.02	1
Radium-226	0.550		0.4330		0.155	0.200	0.0790	pCi/g	0.40	1
Radium-228	0.631		0.4877		0.176		0.134	pCi/g	0.41	1
Thallium-208	0.172		0.2624		0.0677		0.00861	pCi/g	0.61	1
Thorium 228	0.558		0.5703		0.122		0.0450	pCi/g	0.05	1
Thorium-232	0.631		0.4877		0.176		0.134	pCi/g	0.41	1
Thorium-234	-0.389	U	0.3060	U	0.556		0.463	pCi/g	0.69	1
Uranium-235	0.214	U	0.1681	U	0.317		0.588	pCi/g	0.09	1
Uranium-238	-0.389	U	0.3060	U	0.556		0.463	pCi/g	0.69	1

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
 SDG: D11589464

Rad

Leach Batch: 488207

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40219-1	HPPG-SFU-TU098B-B-001	Total/NA	Solid	Dry and Grind	
160-40219-1 DU	HPPG-SFU-TU098B-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 488492

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40219-1	HPPG-SFU-TU098B-B-001	Total/NA	Solid	Fill_Geo-21	488207
MB 160-488492/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488492/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40219-1 DU	HPPG-SFU-TU098B-B-001	Total/NA	Solid	Fill_Geo-21	488207

Prep Batch: 490272

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40219-1	HPPG-SFU-TU098B-B-001	Total/NA	Solid	DPS-0	488207
MB 160-490272/10-B	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-490272/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	



Tracer/Carrier Summary

Page 88 of 88

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40219-1
SDG: D11589464

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)							
160-40219-1	HPPG-SFU-TU098B-B-001	106							
LCS 160-490272/1-A	Lab Control Sample	106							
MB 160-490272/10-B	Method Blank	99.4							

Tracer/Carrier Legend

Sr = Sr Carrier

- 1
- 2
- 3
- 4
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- 10
- 11
- 12

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 20 Lift 3	Soil Origin: TU-098D ESU
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 12/22/2020

Systematic Soil Sample Data: RSY 20 Lift 3							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU098D-001	1	Systematic	12,171	15,658	0.536	0.0136	0.0362
HPPG-ESU-TU098D-002	2	Systematic	12,461	15,658	0.543	-0.0382	N/A
HPPG-ESU-TU098D-003	3	Systematic	12,416	15,658	0.437	-0.0258	N/A
HPPG-ESU-TU098D-004	4	Systematic	12,437	15,658	0.527	0.0219	N/A
HPPG-ESU-TU098D-005	5	Systematic	12,394	15,658	0.652	-0.0621	N/A
HPPG-ESU-TU098D-006	6	Systematic	12,244	15,658	0.403	0.0258	N/A
HPPG-ESU-TU098D-007	7	Systematic	12,557	15,658	0.357	-0.0226	N/A
HPPG-ESU-TU098D-008	8	Systematic	12,528	15,658	0.462	-0.00161	N/A
HPPG-ESU-TU098D-009	9	Systematic	12,524	15,658	0.379	-0.0113	N/A
HPPG-ESU-TU098D-010	10	Systematic	12,242	15,658	0.441	0.0196	N/A
HPPG-ESU-TU098D-011	11	Systematic	12,554	15,658	0.457	-0.0321	-0.0105
HPPG-ESU-TU098D-012	12	Systematic	12,325	15,658	0.343	0.0127	N/A
HPPG-ESU-TU098D-013	13	Systematic	12,518	15,658	0.329	0.025	N/A
HPPG-ESU-TU098D-014	14	Systematic	11,975	15,658	0.103	-0.0049	N/A
HPPG-ESU-TU098D-015	15	Systematic	12,064	15,658	0.436	0.00978	N/A
HPPG-ESU-TU098D-016	16	Systematic	12,504	15,658	0.435	-0.0466	N/A
HPPG-ESU-TU098D-017	17	Systematic	12,872	15,658	0.294	-0.000945	N/A
HPPG-ESU-TU098D-018	18	Systematic	12,199	15,658	0.152	-0.0209	N/A
HPPG-ESU-TU098D-019	19	Systematic	12,674	15,658	0.402	0.0202	N/A
HPPG-ESU-TU098D-020	20	Systematic	12,759	15,658	0.364	-0.0202	N/A
HPPG-ESU-TU098D-021	21	Systematic	12,735	15,658	0.376	0.00544	0.0413
HPPG-ESU-TU098D-022	22	Systematic	12,445	15,658	0.382	0.00336	N/A
HPPG-ESU-TU098D-023	23	Systematic	12,658	15,658	0.494	-0.0192	N/A
HPPG-ESU-TU098D-024	24	Systematic	12,250	15,658	0.345	-0.0347	N/A
HPPG-ESU-TU098D-025	25	Systematic	12,458	15,658	0.469	-0.0289	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)
Maximum					0.652	0.0258	0.0413
Mean					0.4047	-0.0085	0.0223
Median					0.403	-0.0049	0.0362
Minimum					0.103	-0.0621	-0.0105
Standard Deviation					0.1157	0.0244	N/A

Biased Soil Sample Data: RSY 20 Lift 3							
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 Nal Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total ⁹⁰ Sr Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331
HPPG-ESU-TU098D-B-001	1	Biased	12,750	15,658	0.518	0.0184	0.0226

CPM Counts per minute
pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10272020-PG-ROV-241	10/27/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10282020-PG-JSS-249	10/28/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10282020-PG-JSS-247	10/28/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10282020-PG-JSS-247	10/28/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 20 Lift 3
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 17 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 17 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-30.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 31-65). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 31-65). Samples HPPG-F-023 and HPPG-F-024 are field duplicates, correlating to systematic samples -001 and -003. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 31-65). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 20 Lift 3 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation TU-098D ESU.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for TU-098.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-20-U3				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	5.01	28.07	15.81	16.03	4.02
ROI-06	69.15	144.28	103.86	104.19	10.29
ROI-07	51.10	105.25	78.88	78.18	9.06
ROI-08	92.21	168.34	128.75	128.29	11.95
ROI-10	2,237.41	2,838.01	2,600.97	2,603.91	71.44

Statistical Summary Reference Background

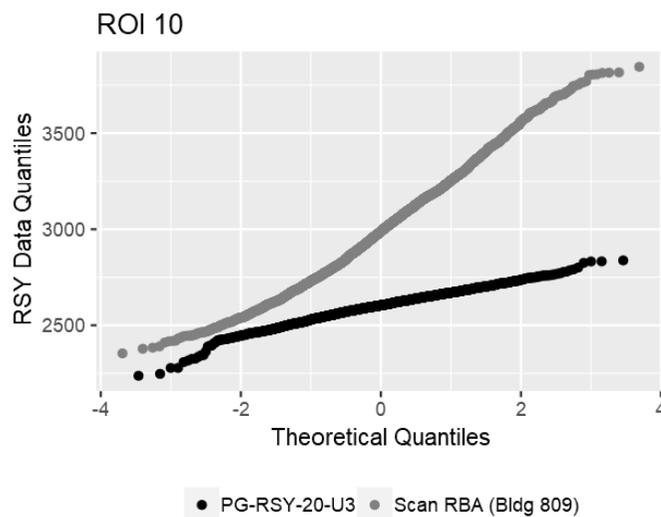
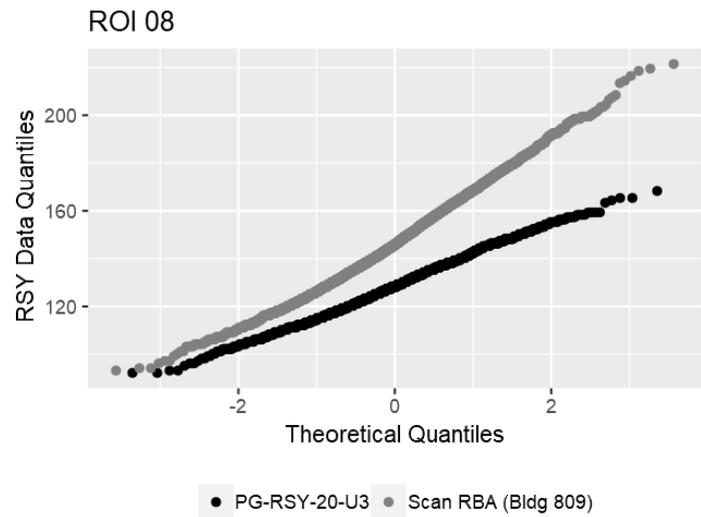
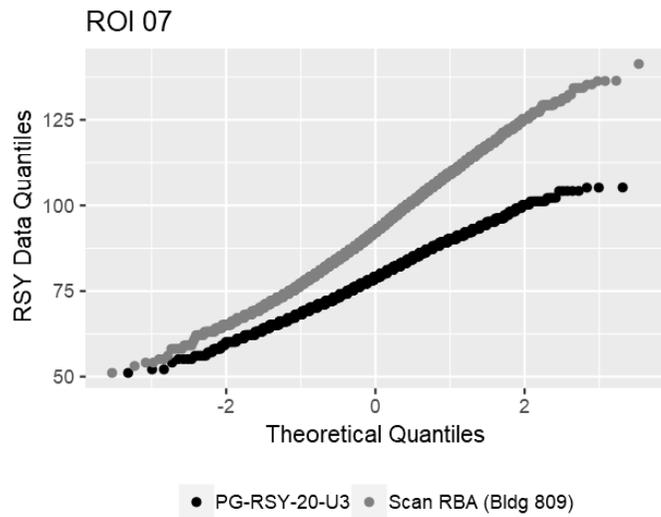
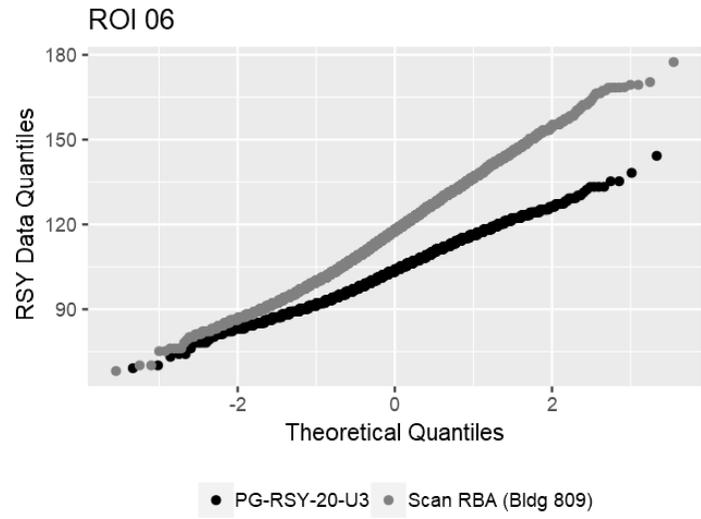
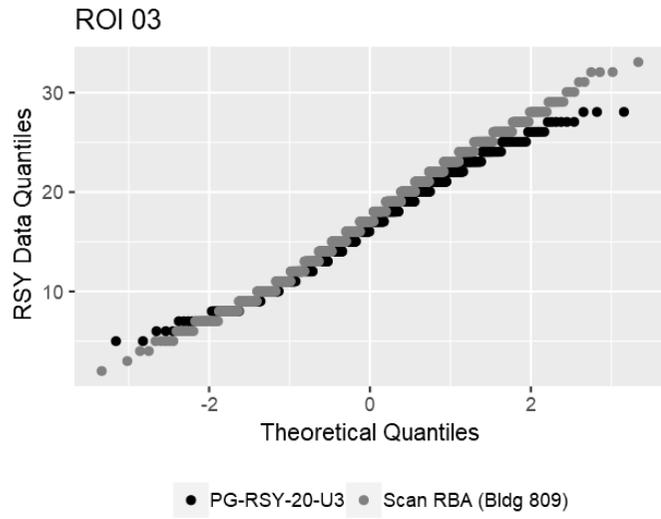
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-20-U3	2053
Scan RBA (Bldg 809)	4632

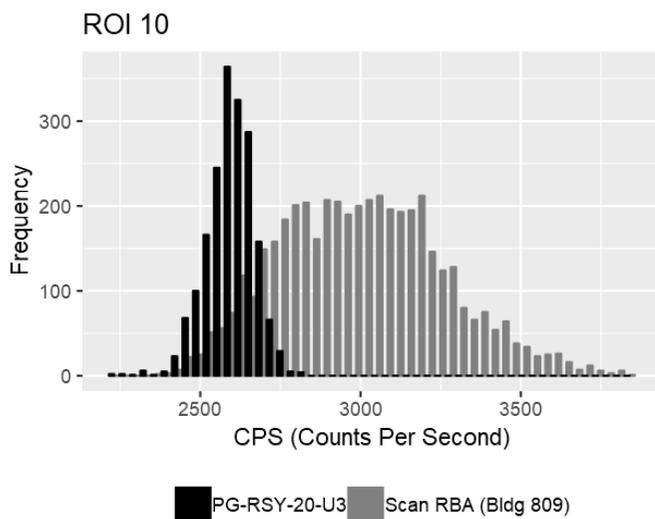
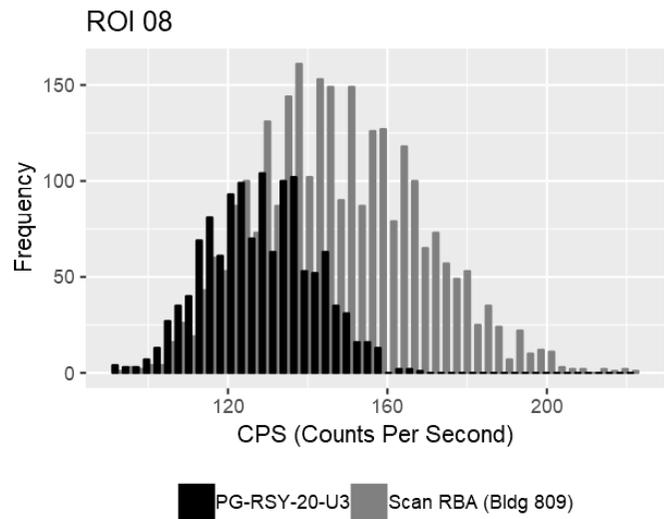
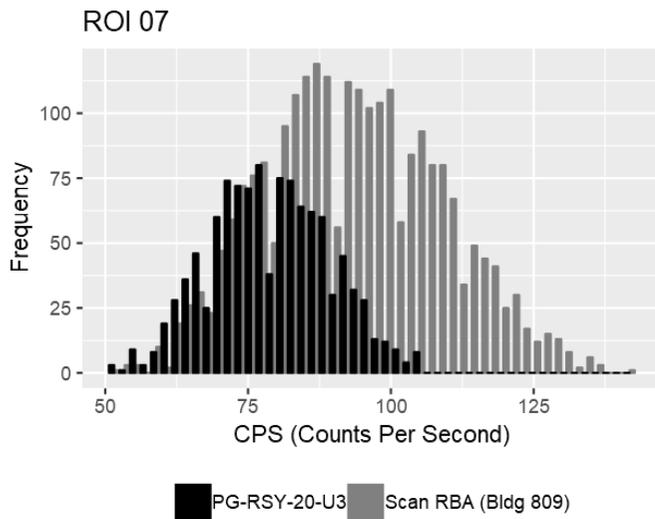
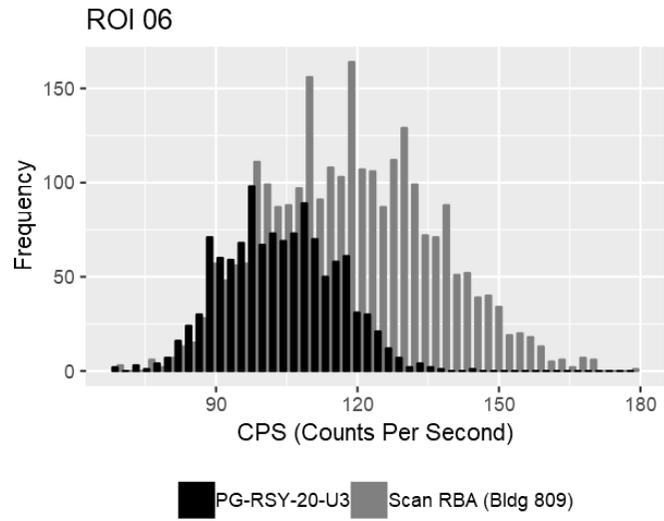
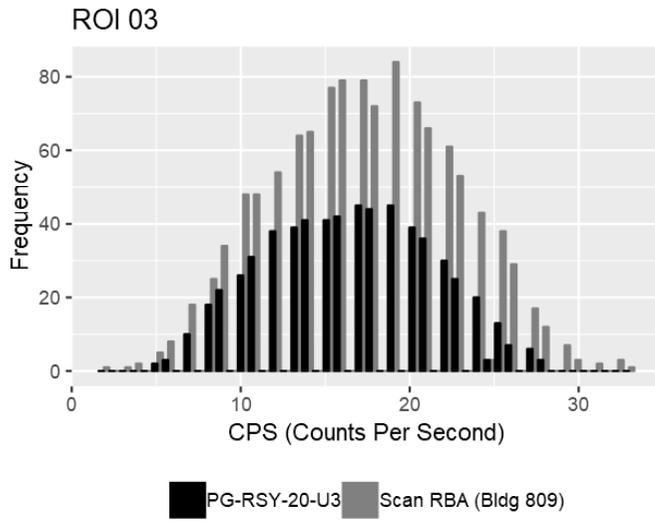
Soil Scan Statistics

Normal Q-Q Plots



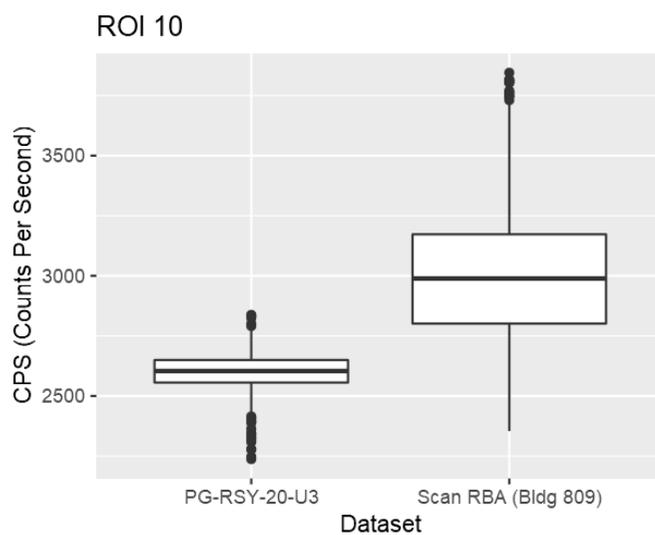
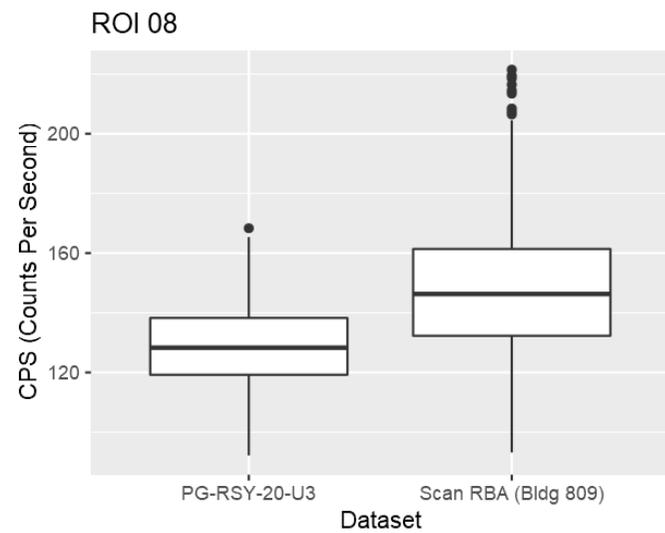
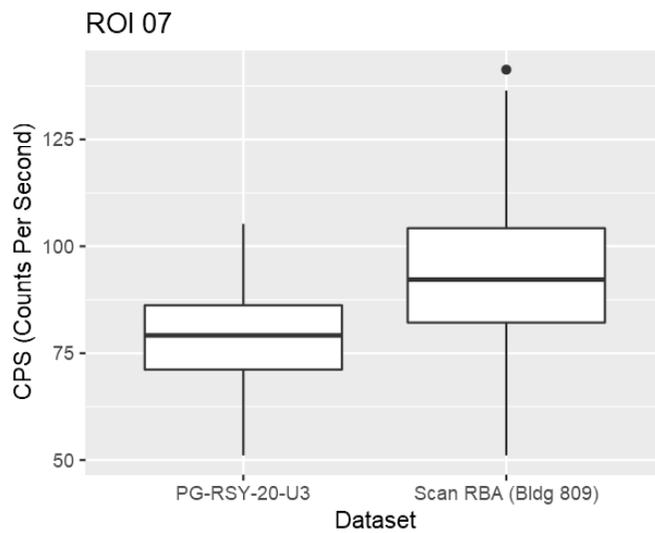
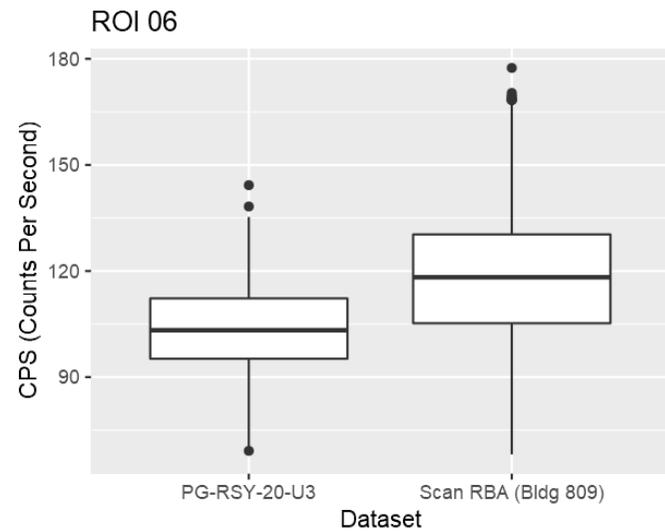
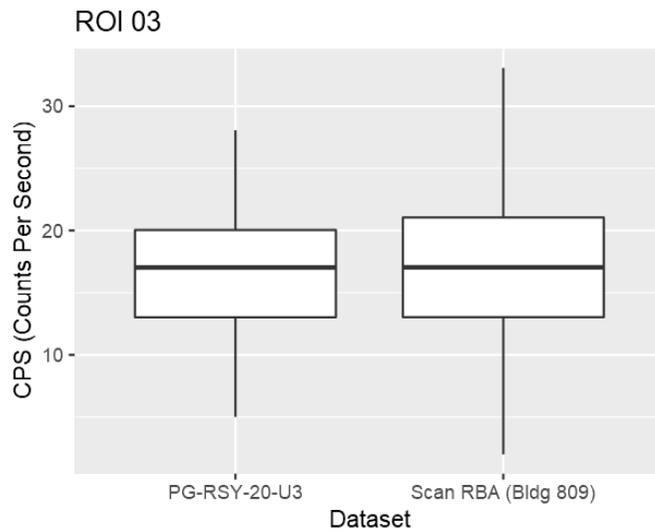
Soil Scan Statistics

Histograms



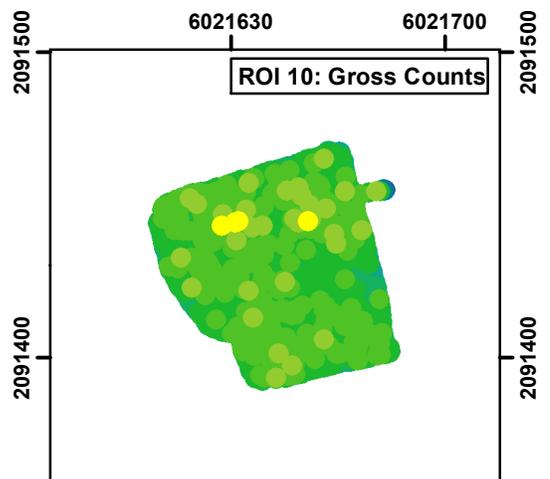
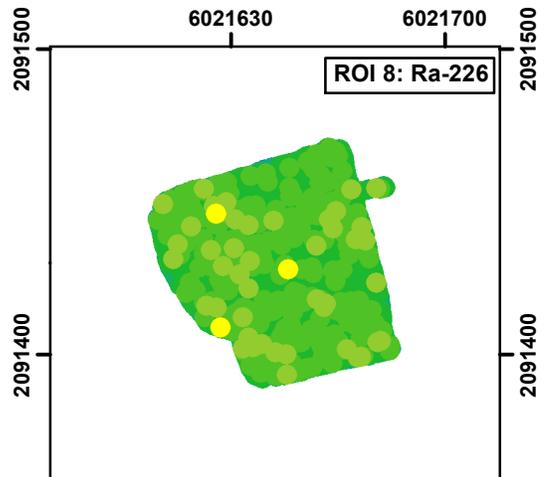
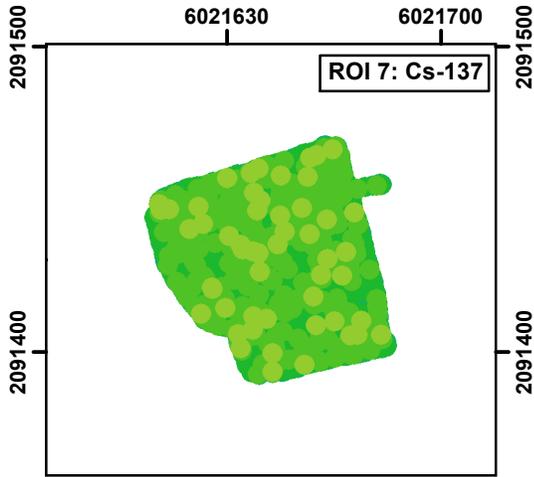
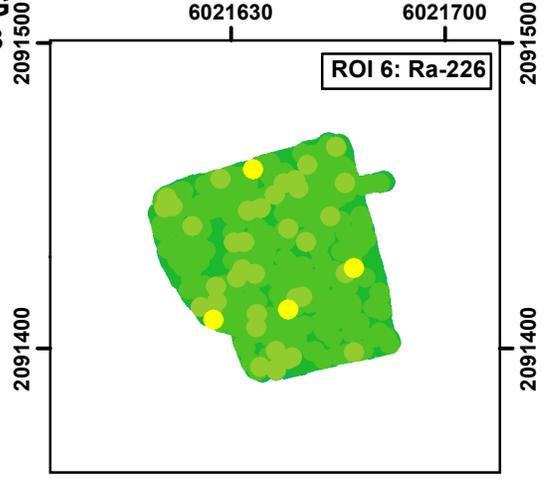
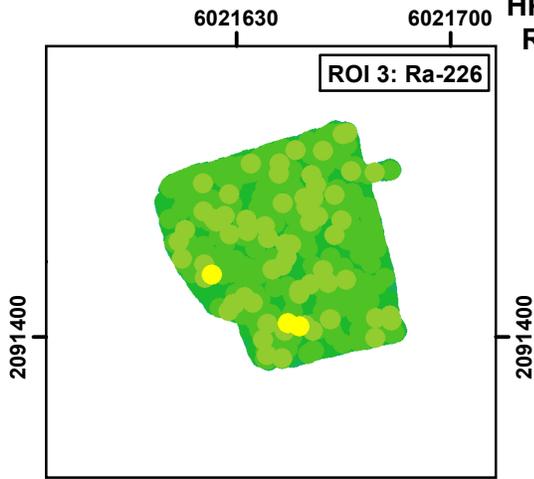
Soil Scan Statistics

Box Plots



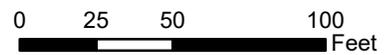
RSI Data Plots
HPNS Parcel G
RSY 20 Use 3

TU-098D ESU



RS 700 Gamma Walkover Survey Data (VD1)

- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

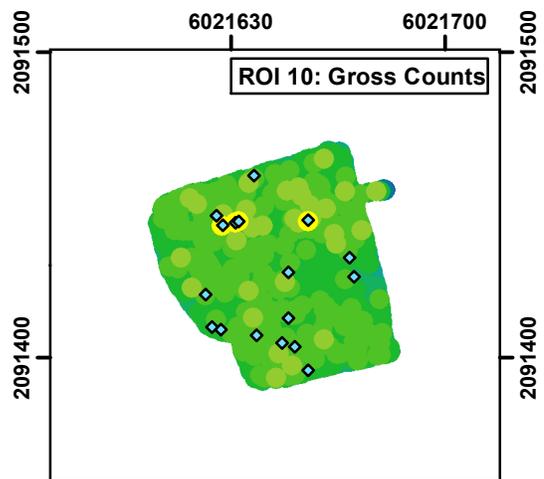
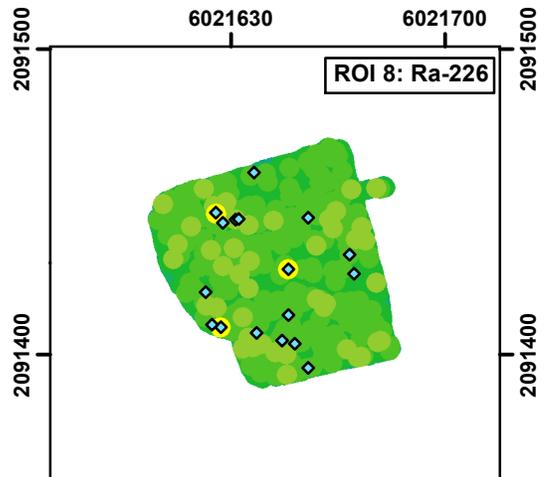
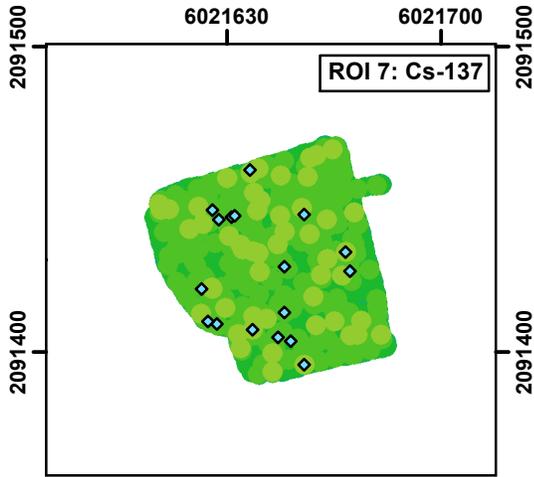
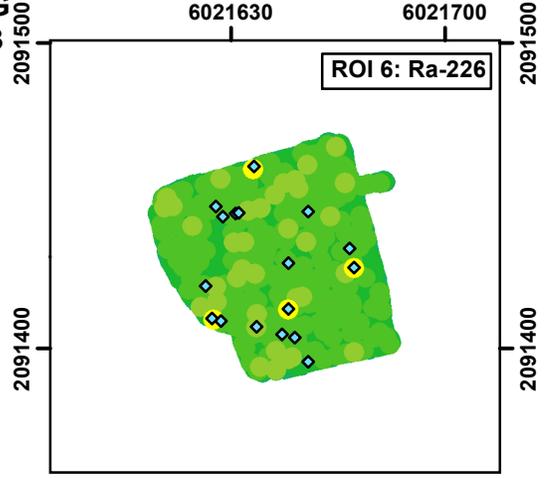
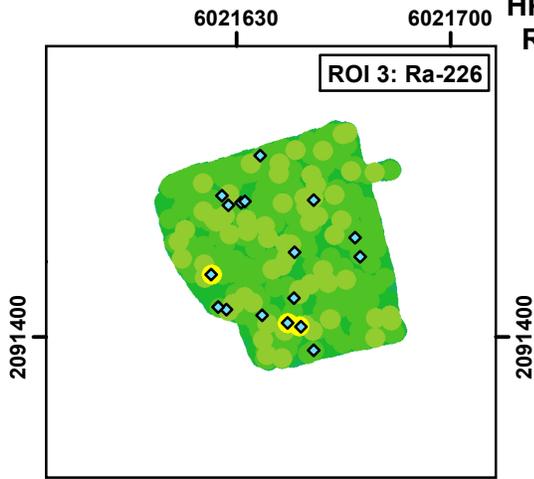


Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Data Plots
HPNS Parcel G
RSY 20 Use 3

TU-098D ESU



RS 700 Gamma Walkover Survey Data (VD1)

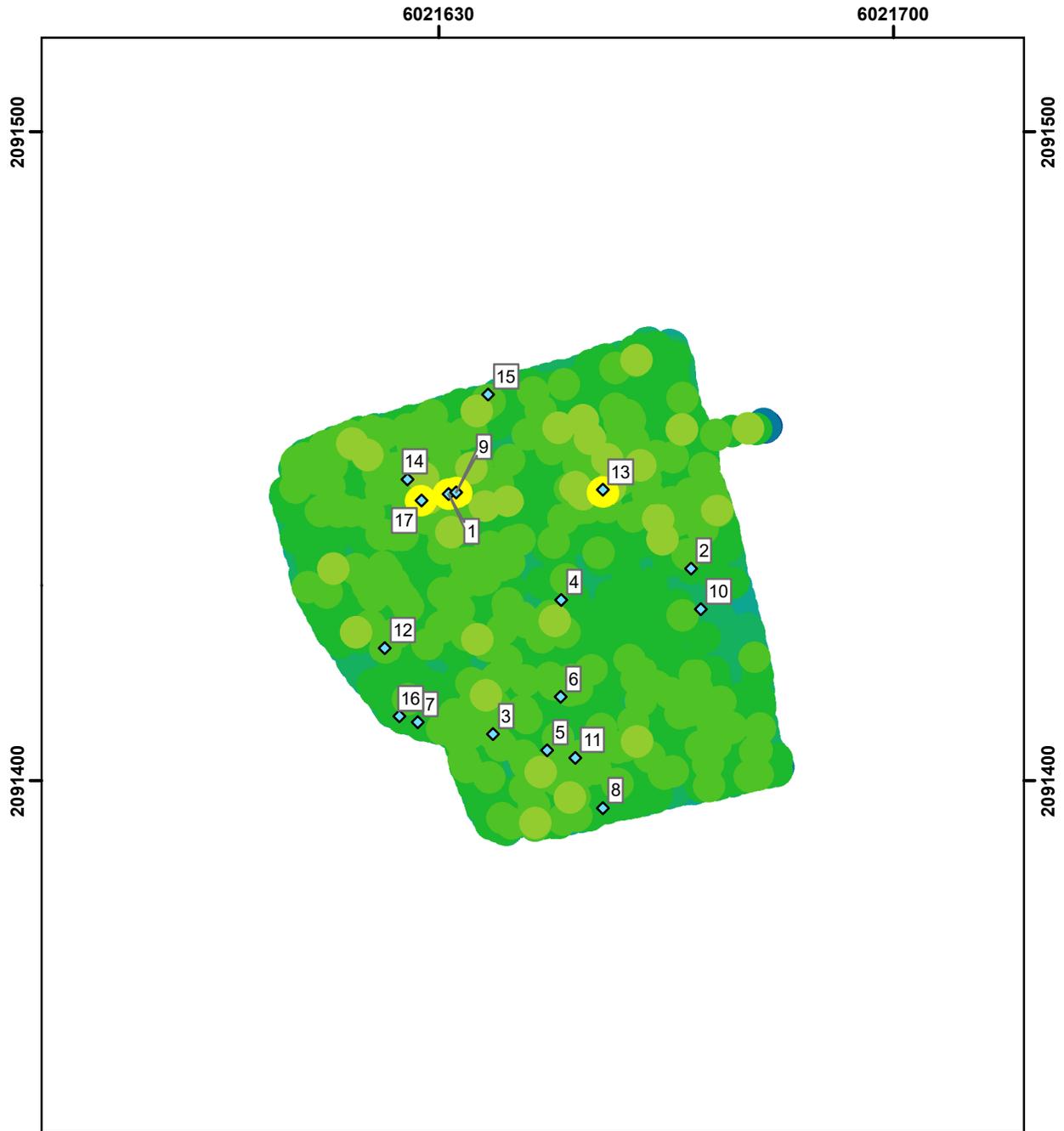
◆ Follow-Up Location	● > -1 to < 0 std dev
● > 3 std dev	● > -2 to < -1 std dev
● > 2 to < 3 std dev	● > -3 to < -2 std dev
● > 1 to < 2 std dev	● < -3 std dev
● > 0 to < 1 std dev	

0 25 50 100 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

Follow-Up Static Survey HPNS Parcel G RSY 20 Use 3

TU-098D ESU



RSY 20 Use 3 (VD1, ROI 10 Gross Gamma)

- | | | |
|----------------------|-----------------------|------------------------|
| ◆ Follow-Up Location | ● > 1 to < 2 std dev | ● > -2 to < -1 std dev |
| ● > 3 std dev | ● > 0 to < 1 std dev | ● > -3 to < -2 std dev |
| ● > 2 to < 3 std dev | ● > -1 to < 0 std dev | ● < -3 std dev |

25 12.5 0 25 Feet

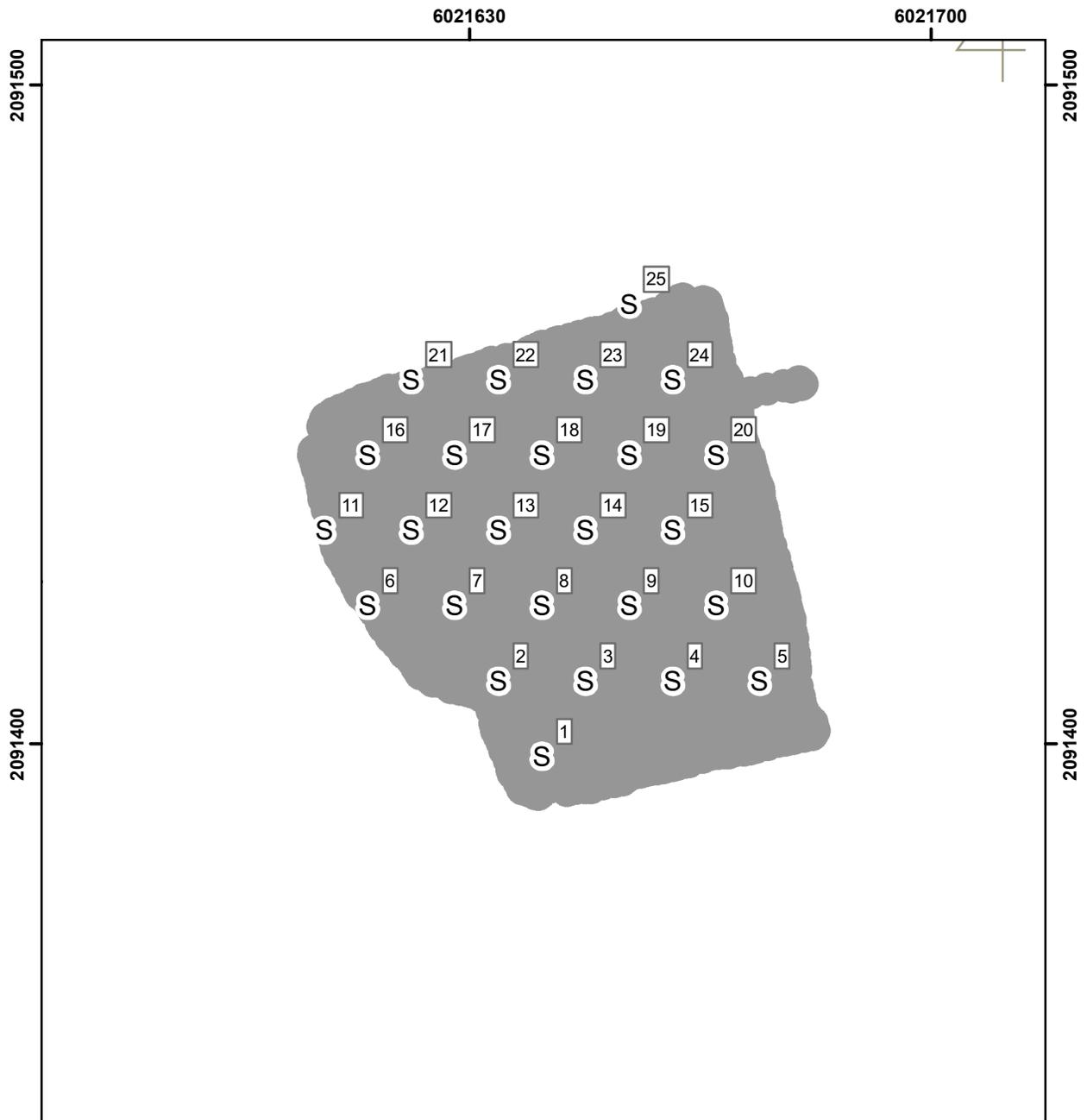


Coordinate system: CSP Zone III, NAD83, US Survey Foot



Systematic Sampling HPNS Parcel G RSY 20 Use 3

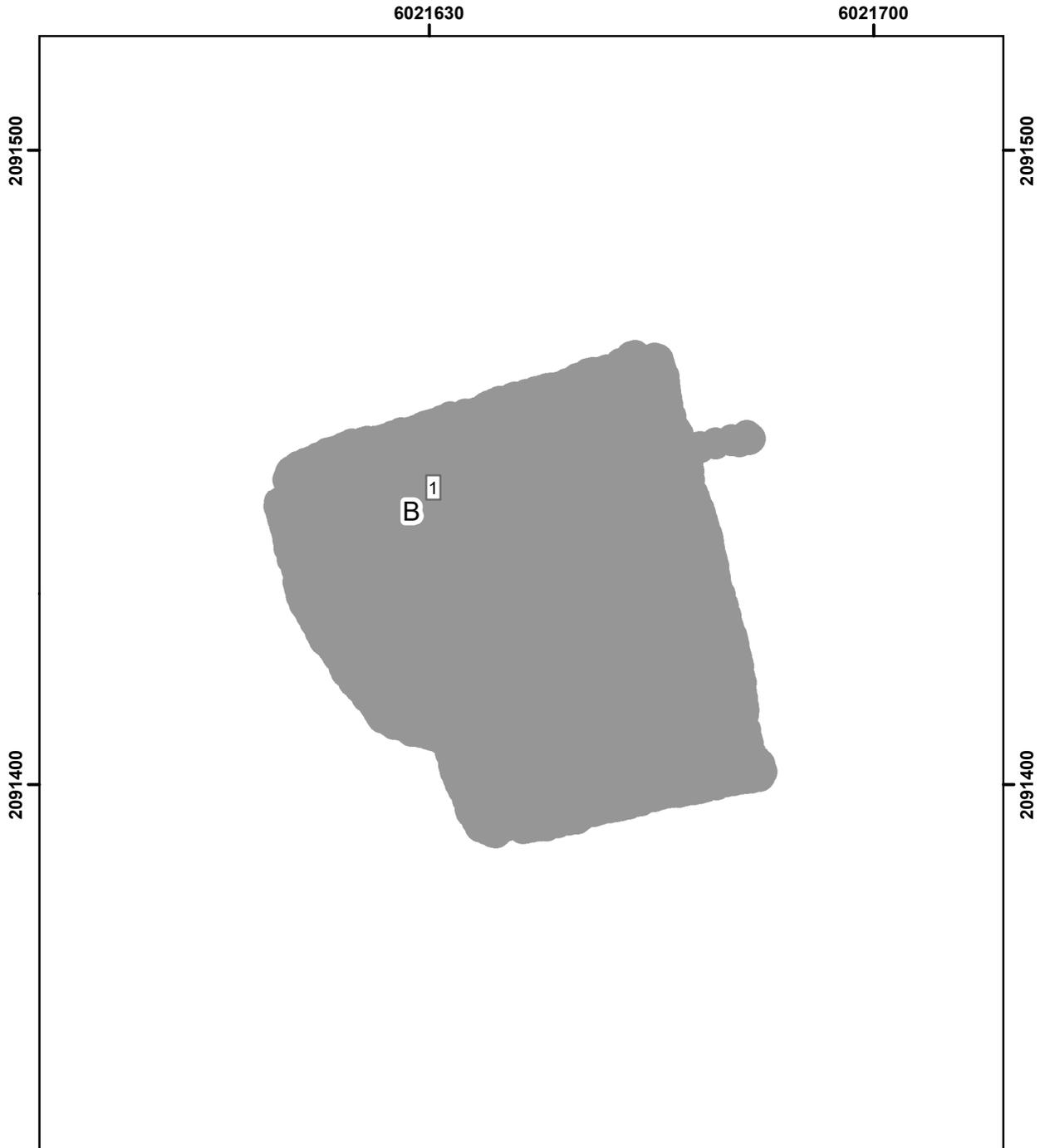
TU-098D ESU



RSY 20 Use 3 S Systematic Sample Location ● RS-700 GWS Coverage	0 10 20 40 Feet
	Coordinate system: CSP Zone III, NAD83, US Survey Foot 

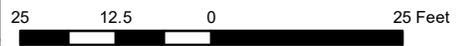
**Biased Sampling
HPNS Parcel G
RSY 20 Use 3**

TU-098D ESU



RSY 20 Use 3

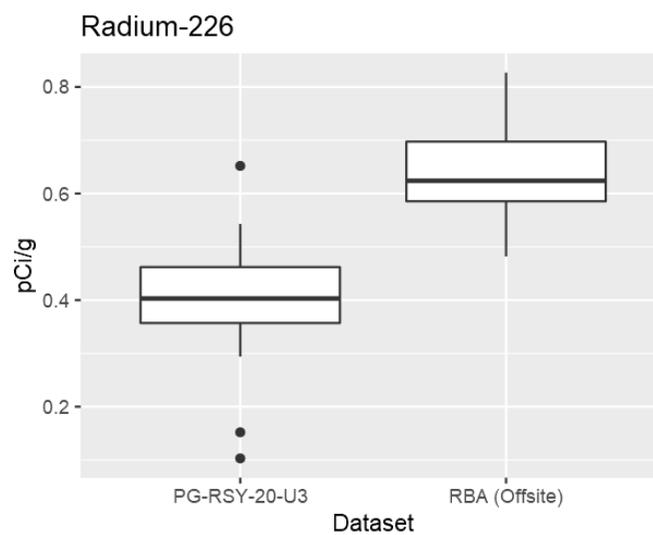
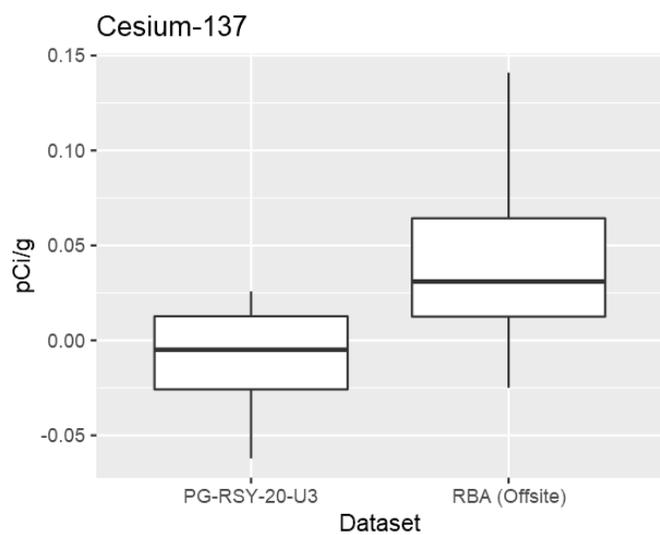
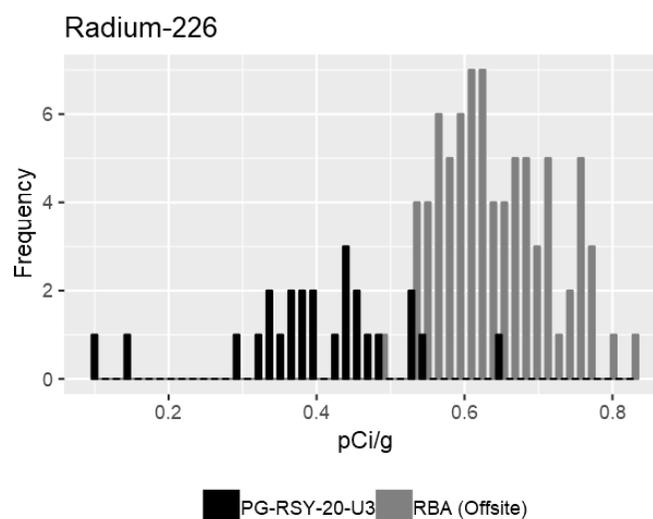
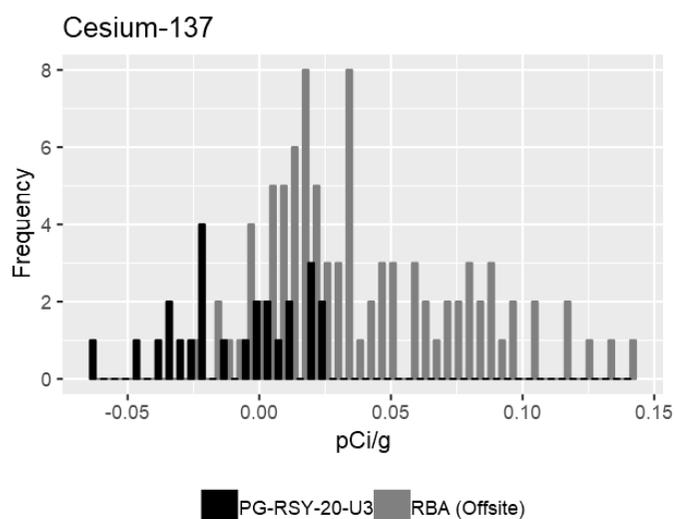
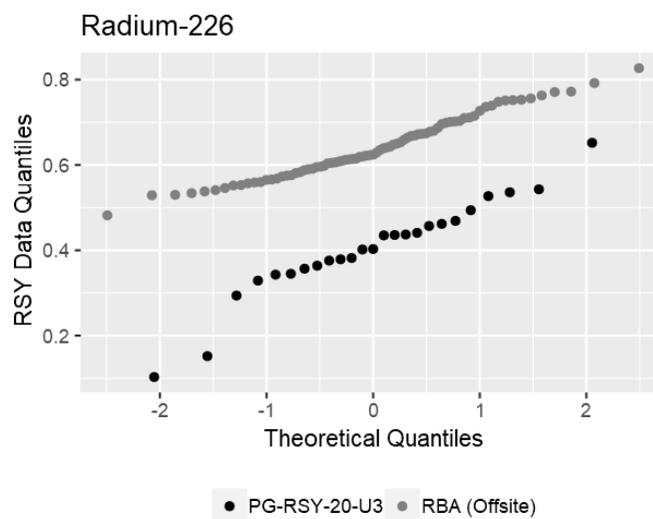
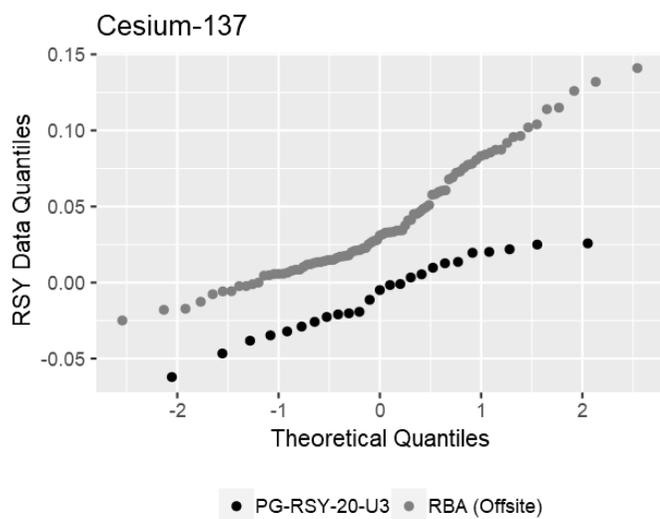
- B** Biased Sample Location
- RS-700 GWS Coverage



Coordinate system: CSP Zone III, NAD83, US Survey Foot



Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: **Rs-226** Location: **RSY 20 Use 3**
 LBGR: **0.403** pCi/g

DOGL: **1** Median SU Data
 LBGR = **0.403**

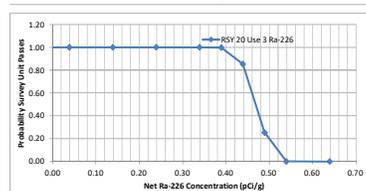
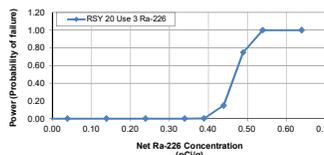
POWER CURVE CALCULATION

DATA	AREA	ADJUSTED DATA	RANKS	SURVEY UNIT RANKS	Sorted Ranks	Location Associated with Sorted Rank
0.59	R	0.588	48.5	0	1	S
0.69	R	0.687	101	0	2	S
0.57	R	0.566	40	0	3	S
0.64	R	0.635	78.5	0	4	S
0.61	R	0.606	58	0	5	S
0.65	R	0.653	87.5	0	6	S
0.61	R	0.613	62	0	7	S
0.71	R	0.711	109	0	8	S
0.68	R	0.68	99.5	0	9	S
0.61	R	0.608	59	0	10	S
0.54	R	0.541	31	0	11	S
0.59	R	0.588	48.5	0	12	S
0.67	R	0.673	96	0	13	S
0.67	R	0.674	97	0	14	S
0.48	R	0.482	26	0	15	S
0.76	R	0.763	121	0	16	S
0.75	R	0.748	115	0	17	S
0.56	R	0.56	37.5	0	18	S
0.61	R	0.614	64	0	19	S
0.53	R	0.529	27	0	20	S
0.61	R	0.605	57	0	21	S
0.58	R	0.575	44	0	22	S
0.67	R	0.672	95	0	23	S
0.56	R	0.559	38	0	24	S
0.68	R	0.664	90.5	0	25	S
0.55	R	0.546	32	0	26	R
0.74	R	0.739	114	0	27	R
0.74	R	0.736	113	0	28	R
0.60	R	0.604	56	0	29	R
0.70	R	0.701	105	0	30	R
0.59	R	0.589	50.5	0	31	R
0.70	R	0.699	104	0	32	R
0.62	R	0.624	73.5	0	33	R
0.58	R	0.583	43	0	34	R
0.57	R	0.573	43	0	35	R
0.62	R	0.623	71	0	36	R
0.60	R	0.598	55	0	37.5	R
0.64	R	0.643	84	0	37.5	R
0.55	R	0.553	34	0	39	R
0.75	R	0.751	116.5	0	40	R
0.72	R	0.711	122	0	41.5	R
0.72	R	0.715	110.5	0	41.5	R
0.62	R	0.62	68	0	43	R
0.71	R	0.71	108	0	44	R
0.58	R	0.581	46	0	45	R
0.60	R	0.595	53	0	46	R
0.58	R	0.58	37.5	0	47	R
0.75	R	0.751	116.5	0	48.5	R
0.67	R	0.669	93.5	0	48.5	R
0.62	R	0.619	67.5	0	49.5	R
0.64	R	0.641	82.5	0	50.5	R
0.59	R	0.589	50.5	0	52	R
0.61	R	0.614	64	0	53	R
0.65	R	0.653	87.5	0	54	R
0.58	R	0.576	45	0	55	R
0.62	R	0.622	69.5	0	56	R
0.57	R	0.565	39	0	57	R
0.63	R	0.629	76.5	0	58	R
0.64	R	0.641	82.5	0	59	R
0.61	R	0.614	64	0	60	R
0.66	R	0.664	90.5	0	61	R
0.77	R	0.772	123	0	62	R
0.64	R	0.639	80.5	0	64	R
0.62	R	0.624	73.5	0	64	R
0.61	R	0.612	61	0	64	R
0.65	R	0.648	85	0	66	R
0.55	R	0.552	33	0	67	R
0.62	R	0.624	73.5	0	68	R
0.62	R	0.616	69.5	0	69.5	R
0.64	R	0.635	78.5	0	69.5	R
0.70	R	0.703	107	0	71	R
0.53	R	0.53	28	0	73.5	R
0.73	R	0.727	112	0	73.5	R
0.62	R	0.624	73.5	0	73.5	R
0.65	R	0.65	80.5	0	75	R
0.67	R	0.668	92	0	76.5	R
0.54	R	0.538	30	0	76.5	R
0.57	R	0.568	41.5	0	78.5	R
0.60	R	0.596	54	0	78.5	R
0.59	R	0.591	52	0	80.5	R
0.68	R	0.678	98	0	80.5	R
0.67	R	0.669	93.5	0	82.5	R
0.79	R	0.792	124	0	82.5	R
0.75	R	0.752	118	0	84	R
0.56	R	0.557	35	0	85	R
0.62	R	0.622	69.5	0	86	R
0.70	R	0.702	106	0	87.5	R
0.64	R	0.639	80.5	0	87.5	R
0.76	R	0.756	120	0	89	R
0.70	R	0.696	102.5	0	90.5	R
0.72	R	0.715	110.5	0	90.5	R
0.66	R	0.659	89	0	92	R
0.70	R	0.696	102.5	0	93.5	R
0.63	R	0.629	76.5	0	93.5	R
0.68	R	0.68	99.5	0	95	R
0.53	R	0.534	29	0	96	R
0.61	R	0.61	60	0	97	R
0.83	R	0.827	125	0	98	R
0.75	R	0.753	119	0	99.5	R
0.57	R	0.568	41.5	0	99.5	R
0.596	S	0.133	23	23	101	R
0.543	S	0.14	24	24	102.5	R
0.437	S	0.034	16	16	102.5	R
0.527	S	0.124	22	22	104	R
0.62	S	0.249	25	25	105	R
0.603	S	0	13	13	106	R
0.357	S	-0.046	7	7	107	R
0.462	S	0.059	10	10	108	R
0.379	S	-0.024	10	10	109	R
0.441	S	0.038	17	17	110.5	R
0.467	S	0.054	18	18	110.5	R
0.343	S	-0.06	5	5	112	R
0.329	S	-0.074	4	4	113	R
0.103	S	-0.3	1	1	114	R
0.498	S	0.033	15	15	115	R
0.435	S	0.032	14	14	116.5	R
0.294	S	-0.109	3	3	116.5	R
0.152	S	-0.251	2	2	118	R
0.402	S	-0.001	12	12	119	R
0.364	S	-0.039	8	8	120	R
0.376	S	-0.027	9	9	121	R
0.382	S	-0.021	11	11	122	R
0.494	S	0.091	21	21	123	R
0.345	S	-0.058	6	6	124	R
0.469	S	0.068	20	20	125	R
Sum =			7876	325		

SU Stats
 Count: 25
 SD: 0.116
 Median: 0.403
Ref Stats
 Count: 100
 SD: 0.073
 Critical Value: 1951.9

Number of Samples
 LBGR: 0.403
 A/c: 5.16
 Pr: 1
 N: 25.23
 Actual N: 25
 SU a: 0.116
 Z(1-alpha): 2.326
 Z(1-beta): 1.645

Concentration (C)	(C-LBGR) SD	p1	p2	E(Wmw)	Var(Wmw)	SD(Wmw)	z	Power	Probability of passing	
0.6	-0.26	-5.7	0.00001	0.00000	0.025	0.024989	0.158016	10292.2	0.00	1.00
0.7	-0.16	-4.9	0.00020	0.0001	0.51	3.572099	1.89	869.236	0.00	1.00
0.8	-0.06	-4.0	0.00234	0.00017	5.8475	57.65651	7.593189	213.416	0.00	1.00
0.9	0.04	-3.1	0.01695	0.00269	42.3675	790.5102	27.93761	56.6973	0.00	1.00
1	0.14	-2.3	0.03855	0.00847	98.375	2238.671	47.31459	32.3363	0.00	1.00
1.1	0.24	-1.4	0.16110	0.06390	402.748	12005.68	109.5704	11.1673	0.00	1.00
1.2	0.34	-0.6	0.33689	0.18476	839.218	22720.33	150.7326	5.22208	0.00	1.00
1.25	0.39	-0.1	0.47161	0.30561	1179.54	26144.76	161.6934	2.76338	0.00	1.00
1.3	0.44	0.3	0.58400	0.42142	1460	25318.47	159.1178	1.04552	0.15	0.85
1.35	0.49	0.7	0.68969	0.54407	1724.23	21567.84	146.8599	-0.6664	0.75	0.25
1.4	0.54	1.2	0.80193	0.69990	2004.82	14760.88	121.4944	-3.1151	1.00	0.00
1.5	0.64	2.0	0.92158	0.89577	2303.38	8372.123	73.28476	-9.2369	1.00	0.00



QUANTILE TEST
 From NUREG 1505, Table A.7b. Values of r and k for the Quantile Test When α is Approximately 0.025

25 n (number of survey unit measurements)
 100 m (number of reference area measurements)
 Use: $m = 100$
 $n = 25$
 4 r
 3 k
 0.025 α

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

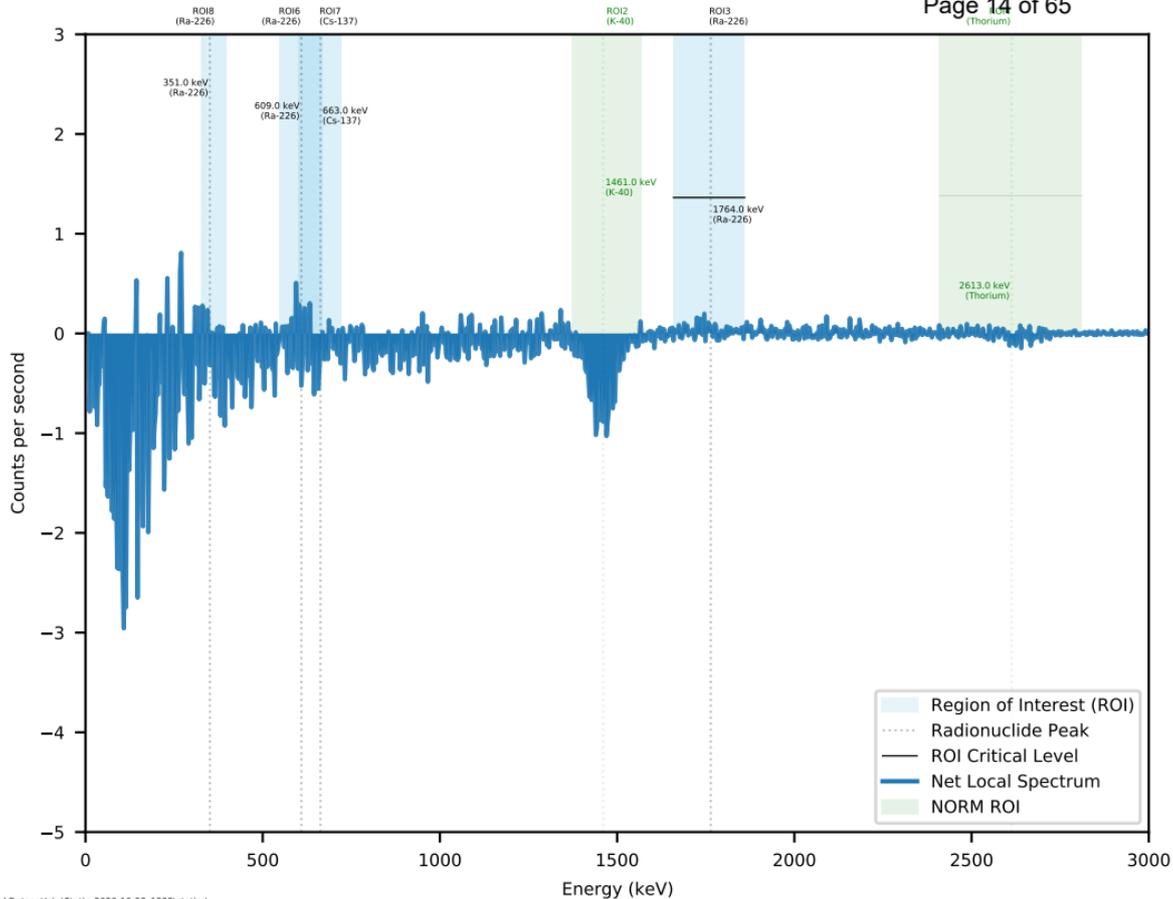
0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

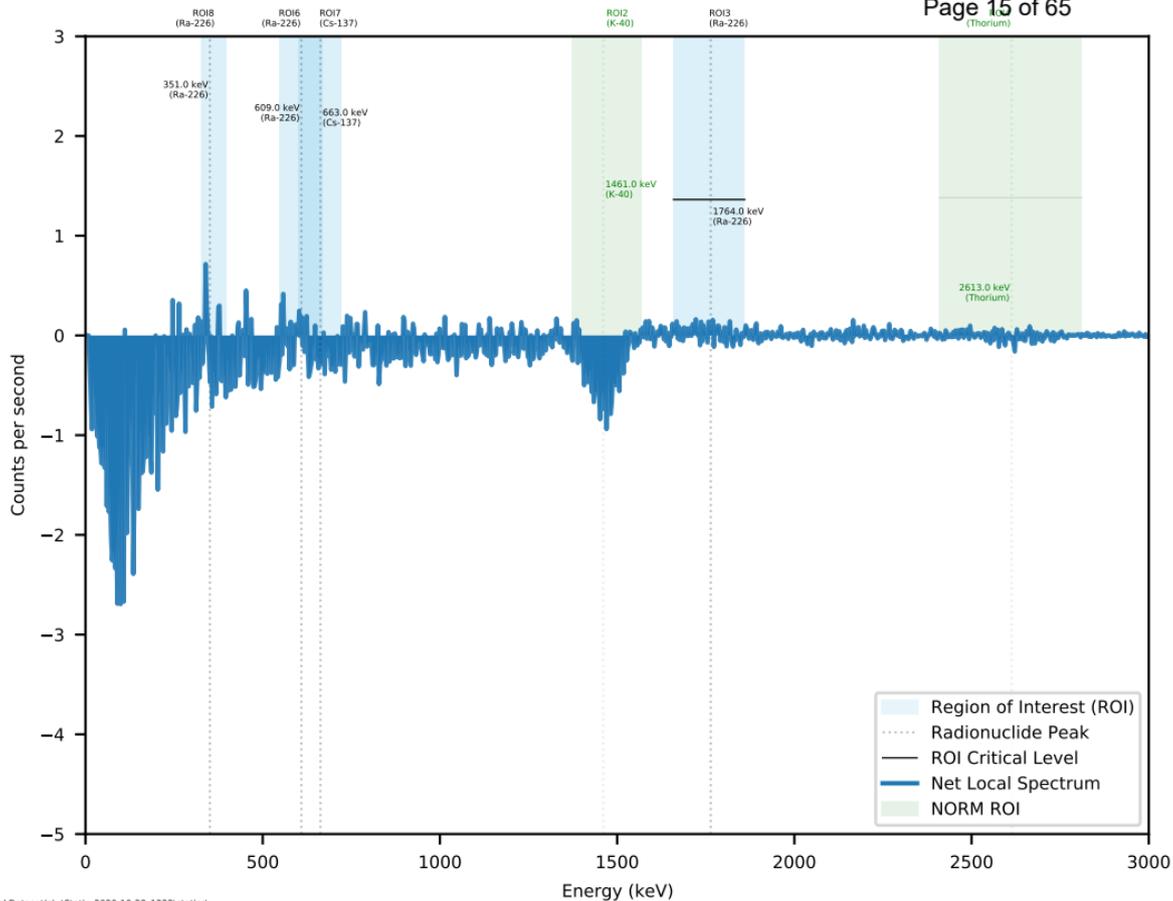
of R: 100 n
 # of S: 25 m
 Avg Rank R: 73.5
 Avg Rank S: 13

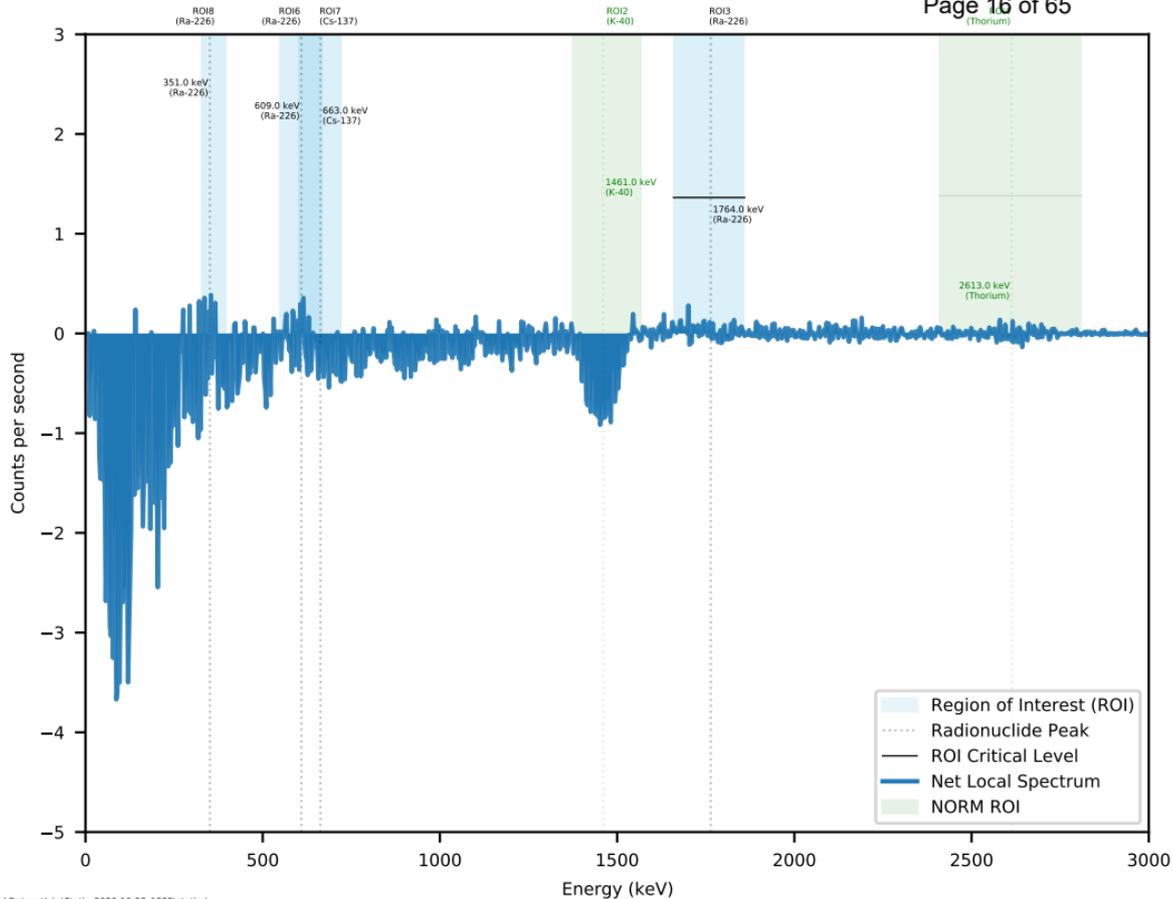
For m or n greater than 20, the critical value (k) can be calculated from
 $\frac{m(n+m+1)}{2} + z \sqrt{\frac{nm(n+m+1)}{12}}$

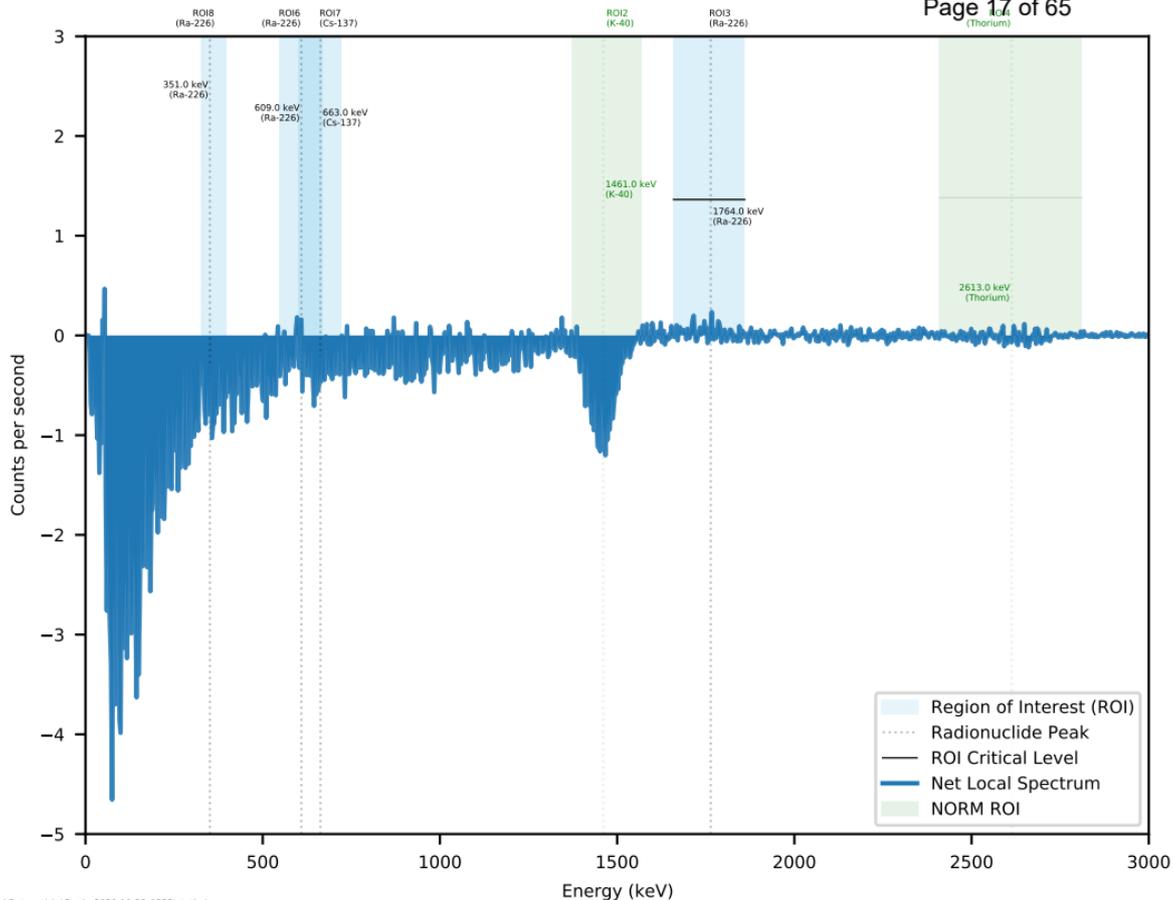
$z = 99.0\%$ percentile of standard normal distribution = 2.326
 $k = 1951.9$
 $\alpha = \alpha/2 = 0.01$
 $\beta = 0.05$

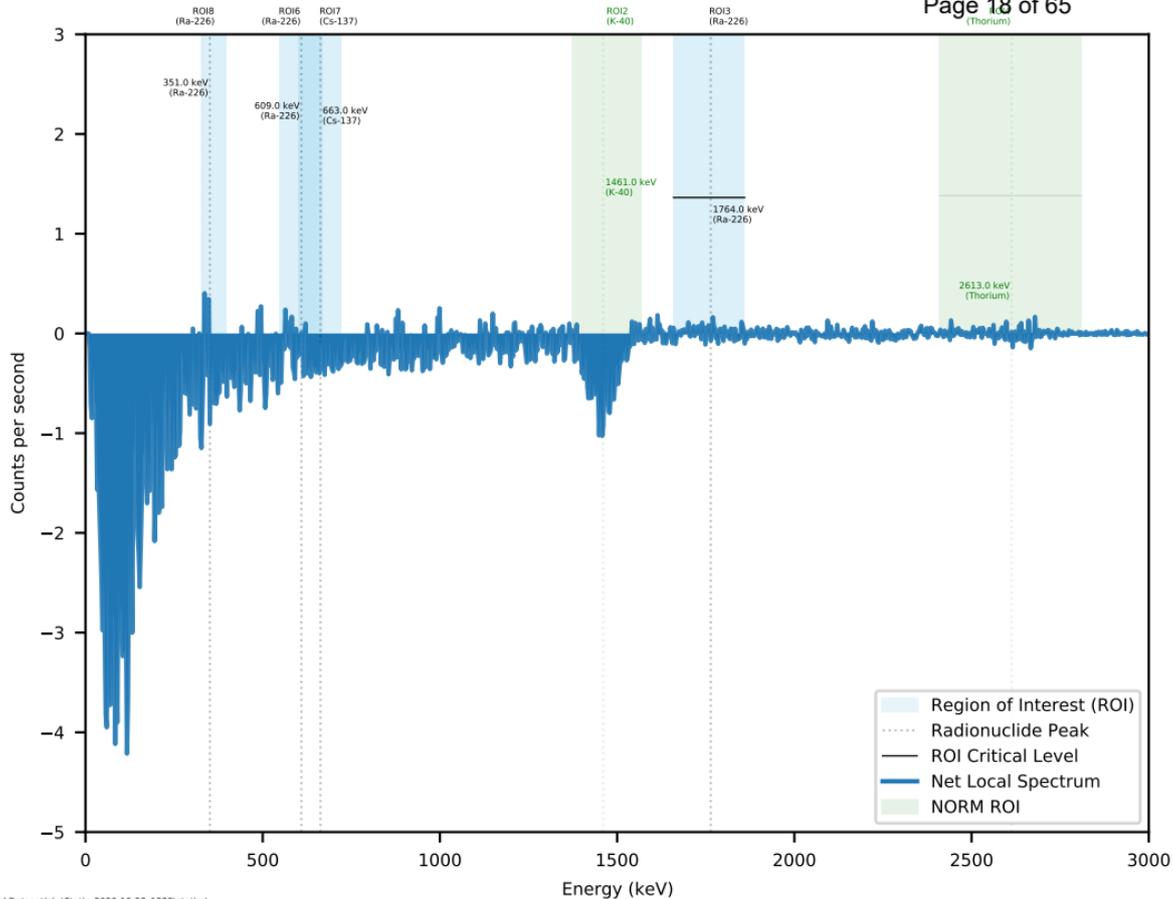
Since the sum of survey unit ranks is less than the critical value, the null hypothesis that the survey unit concentrations do not exceed the LBGR is accepted (i.e., survey unit passes).

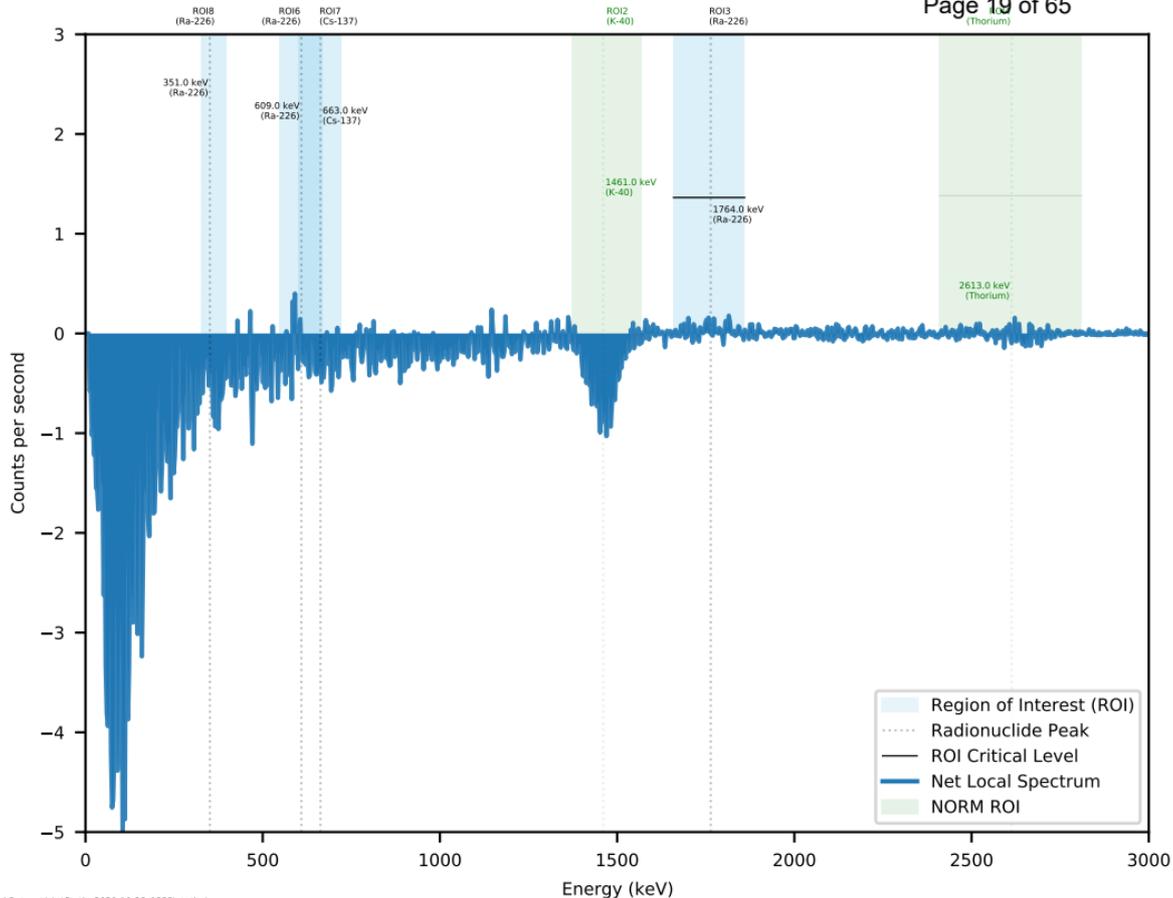


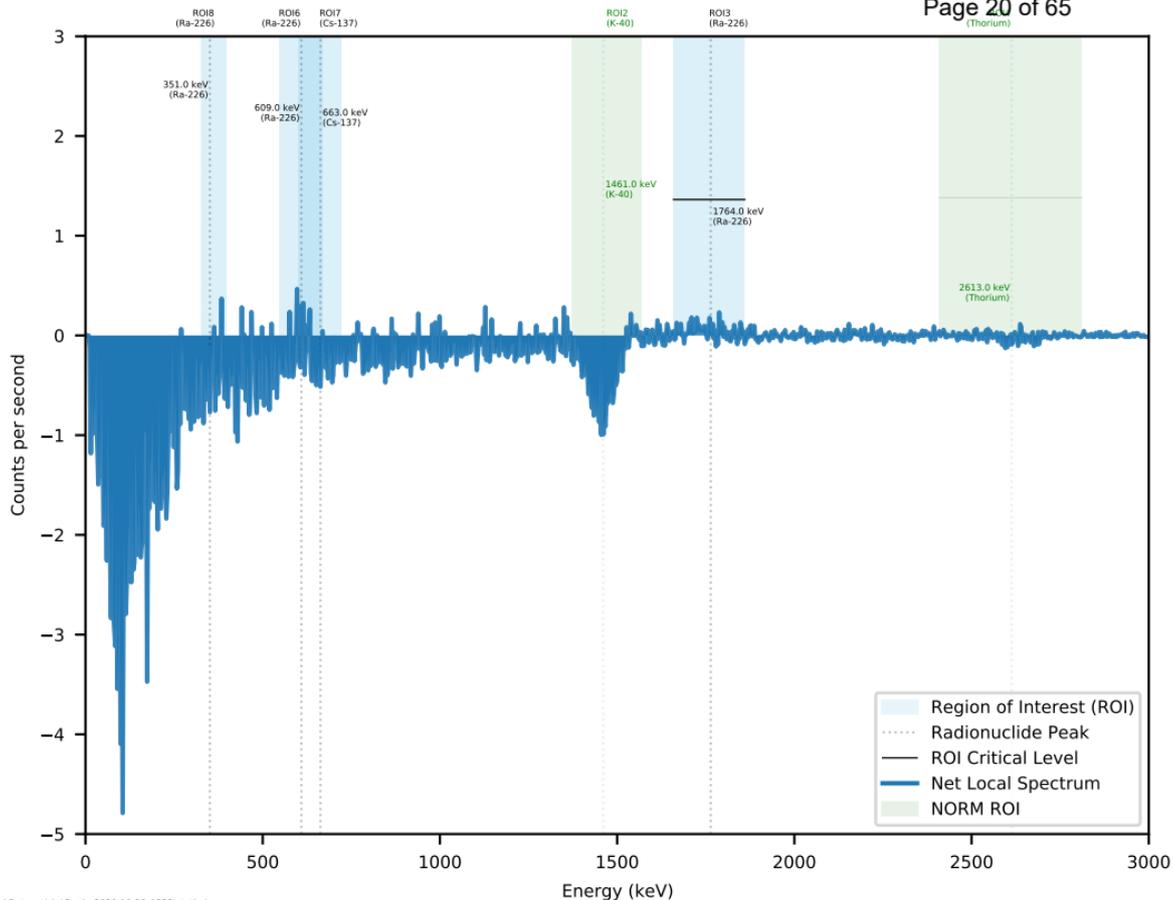


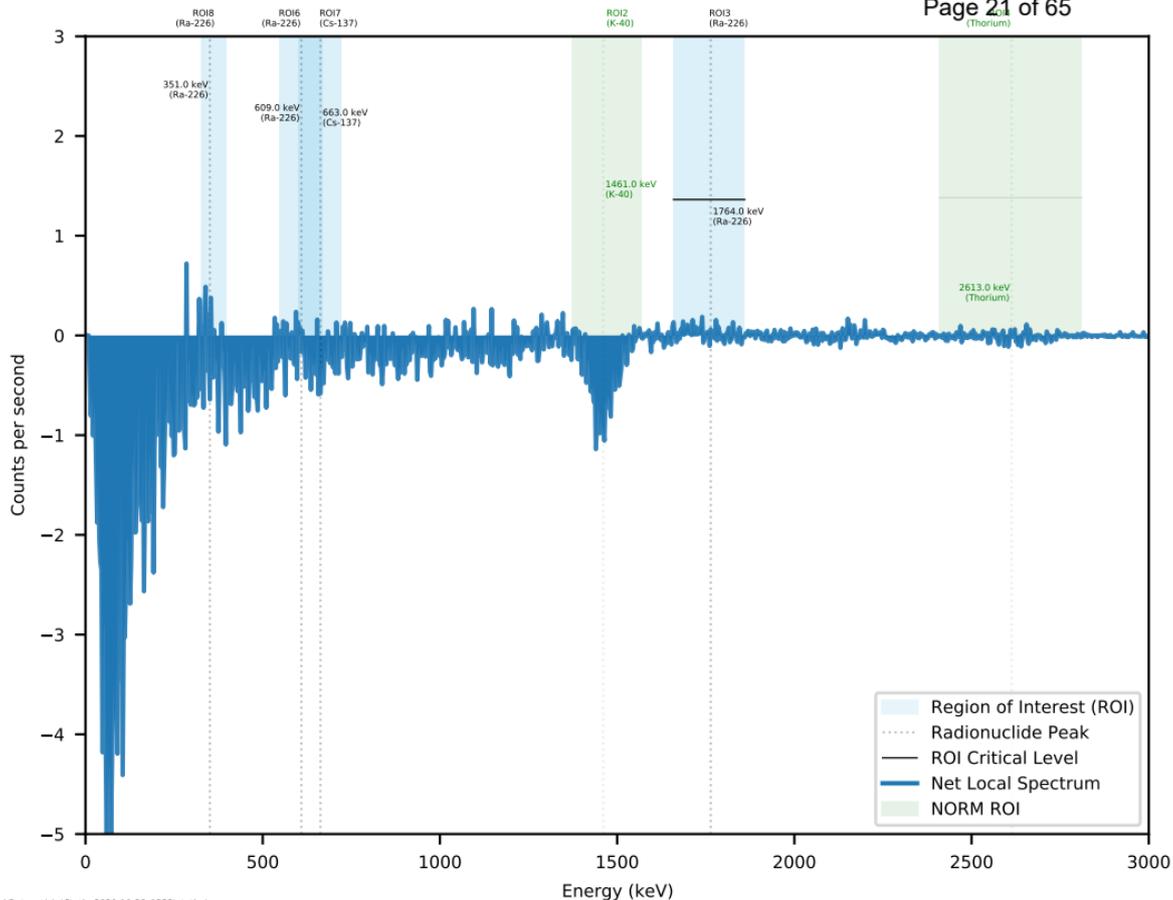


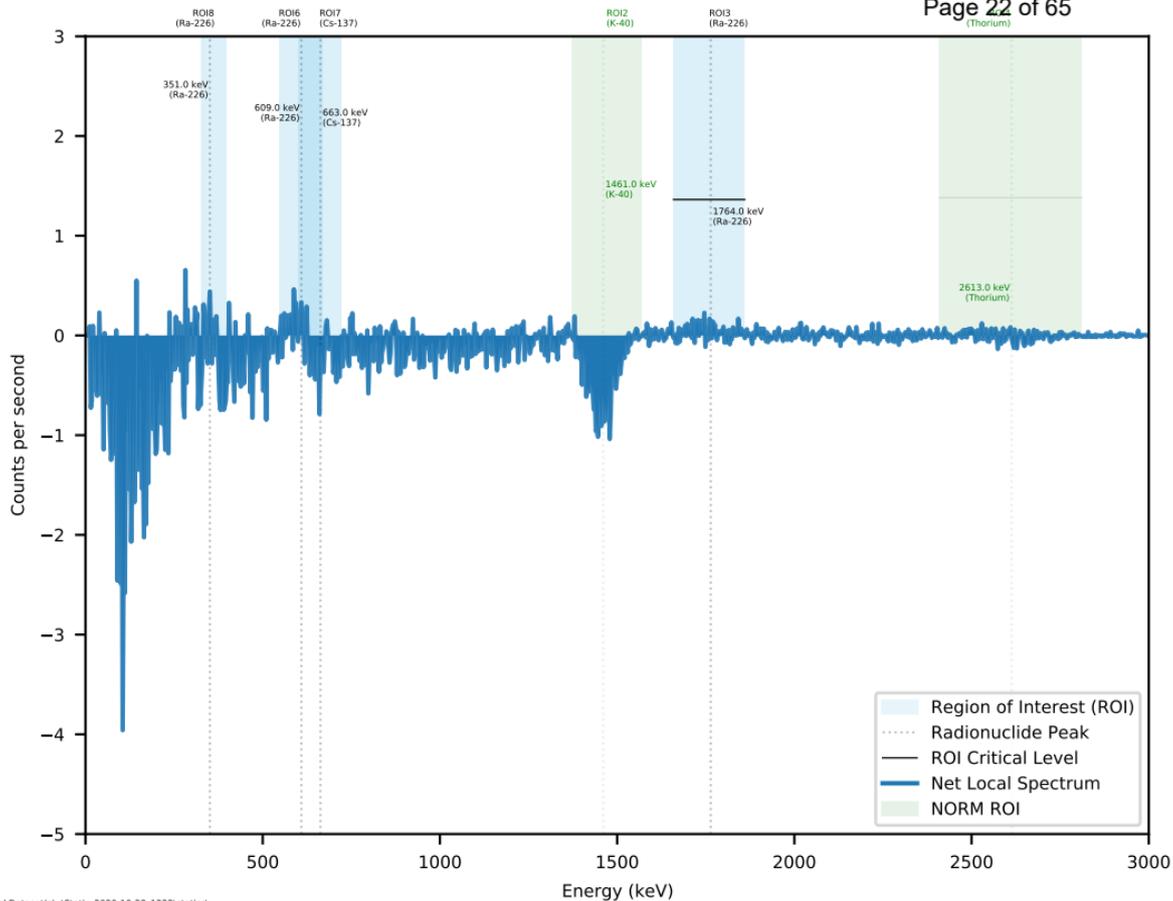


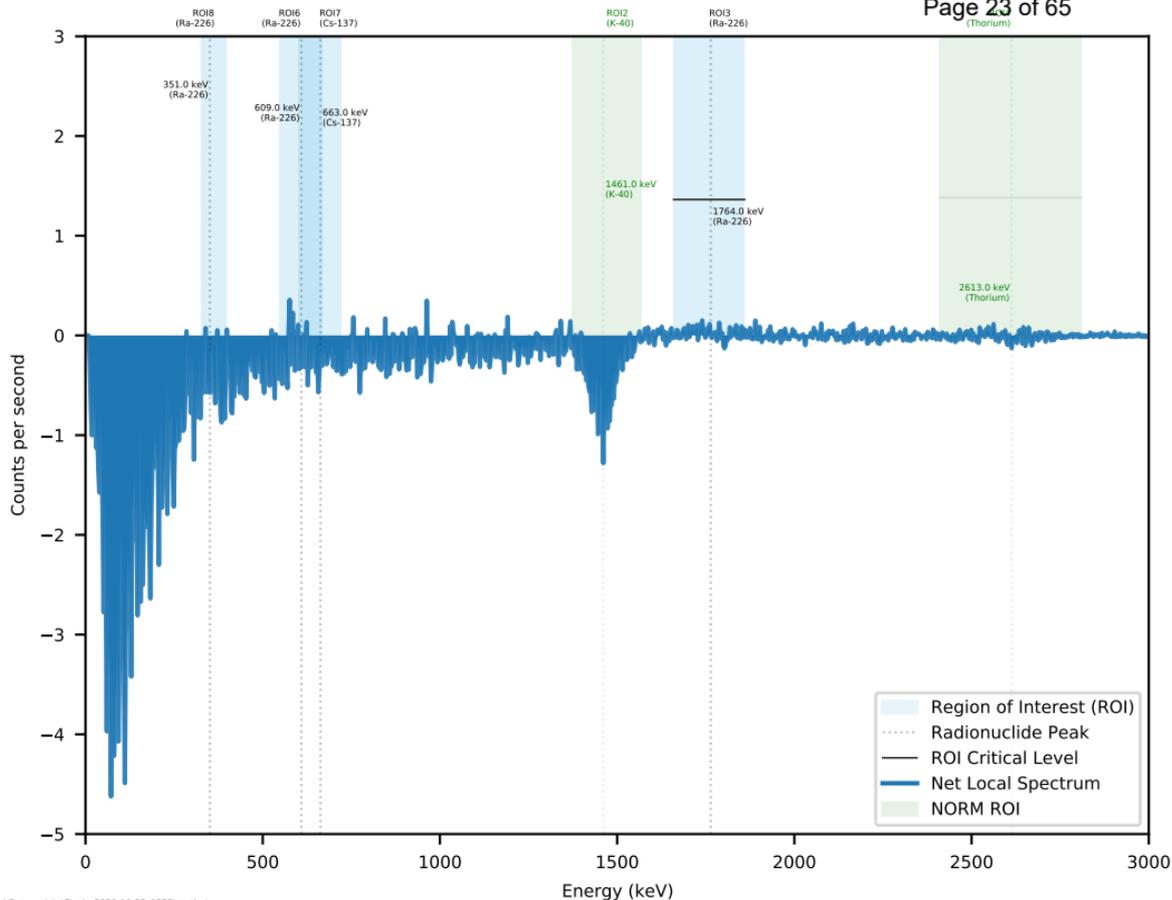


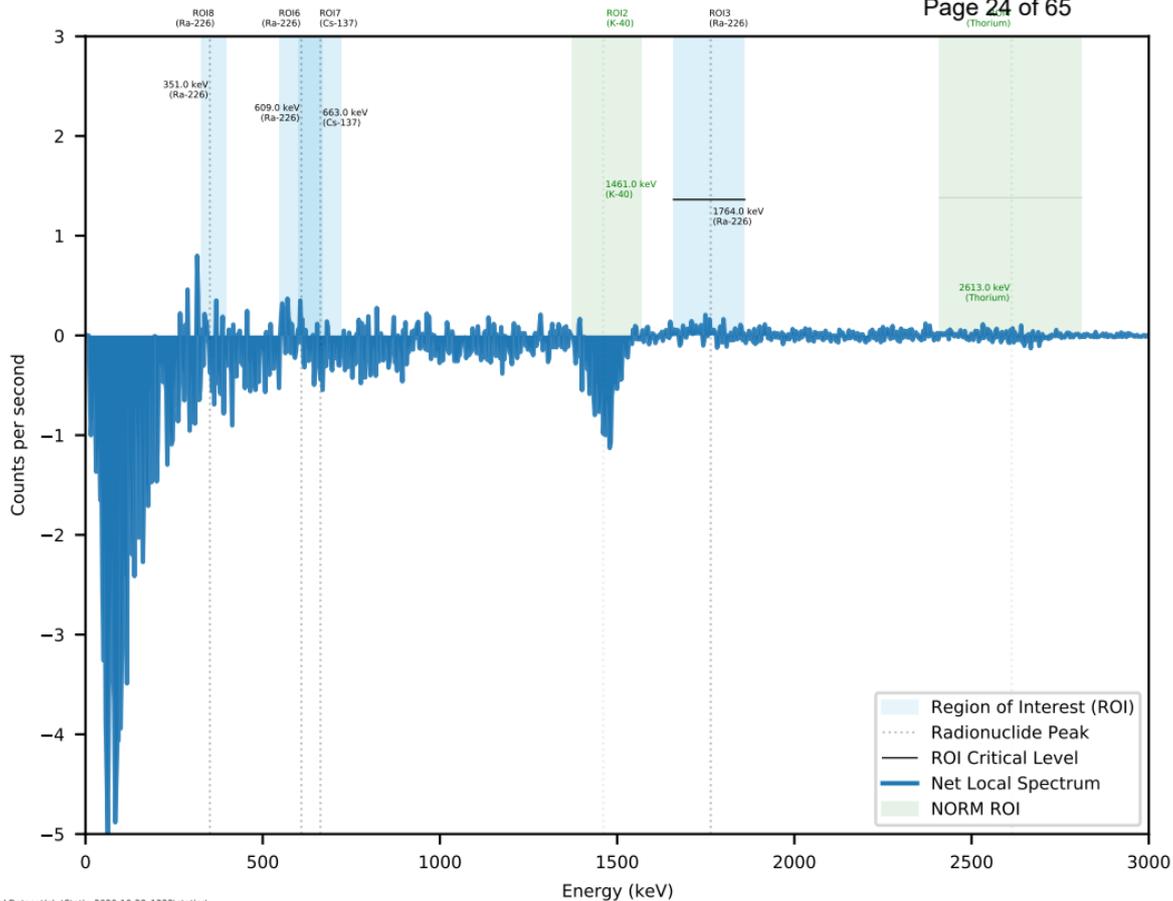


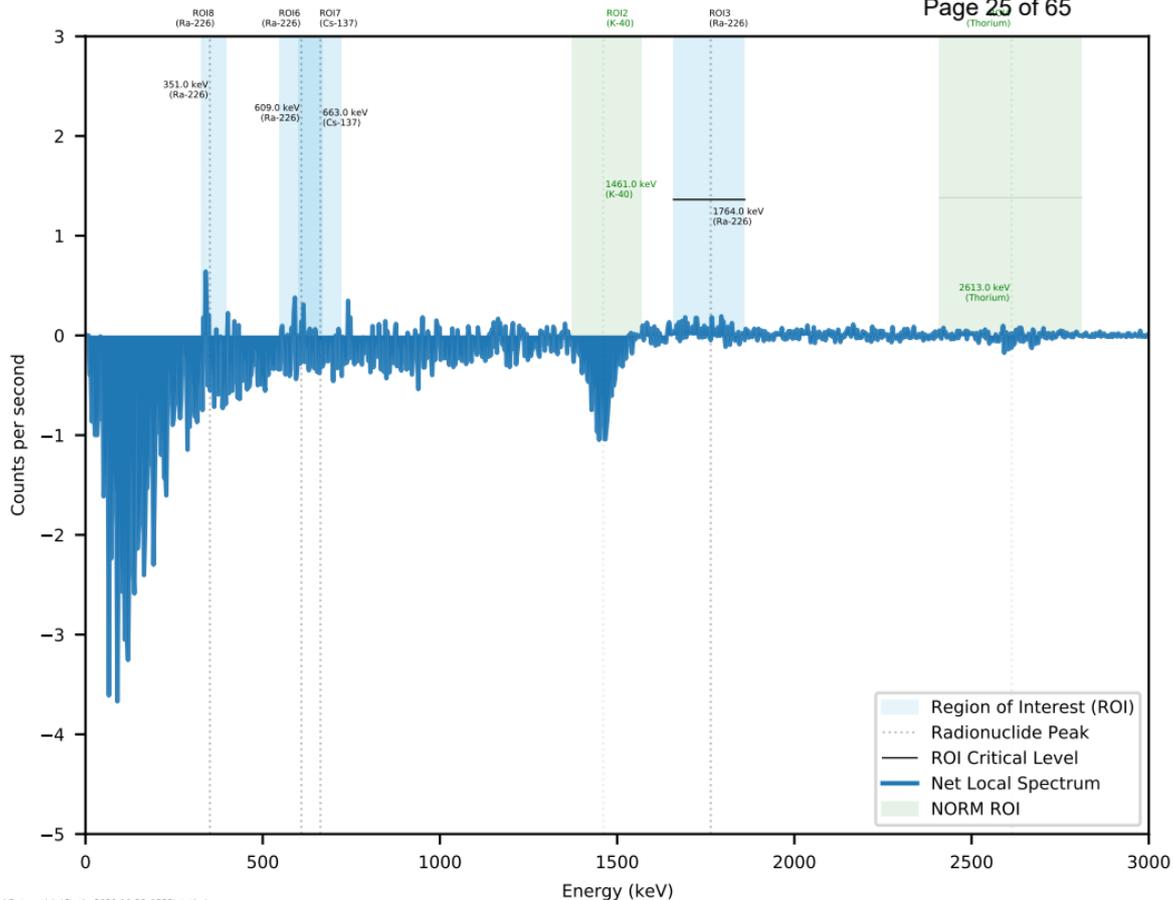


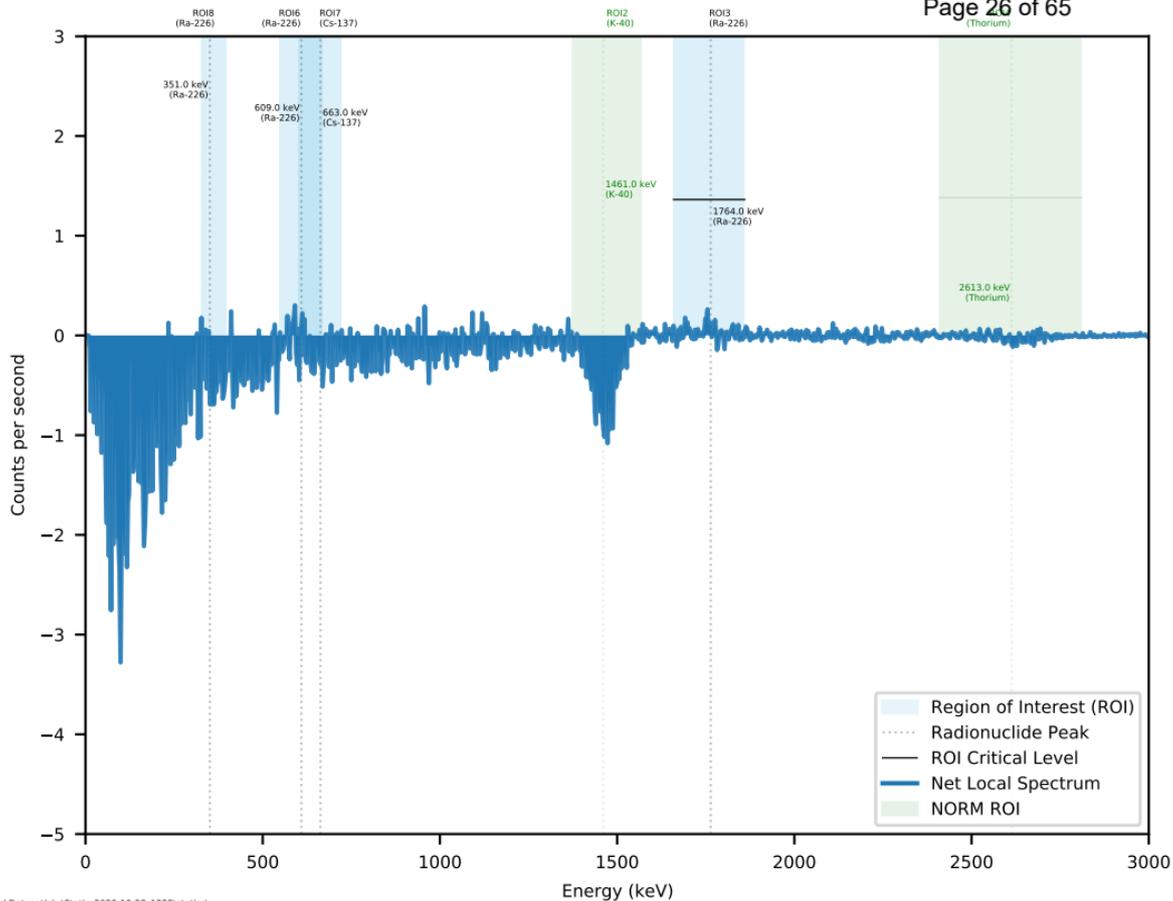


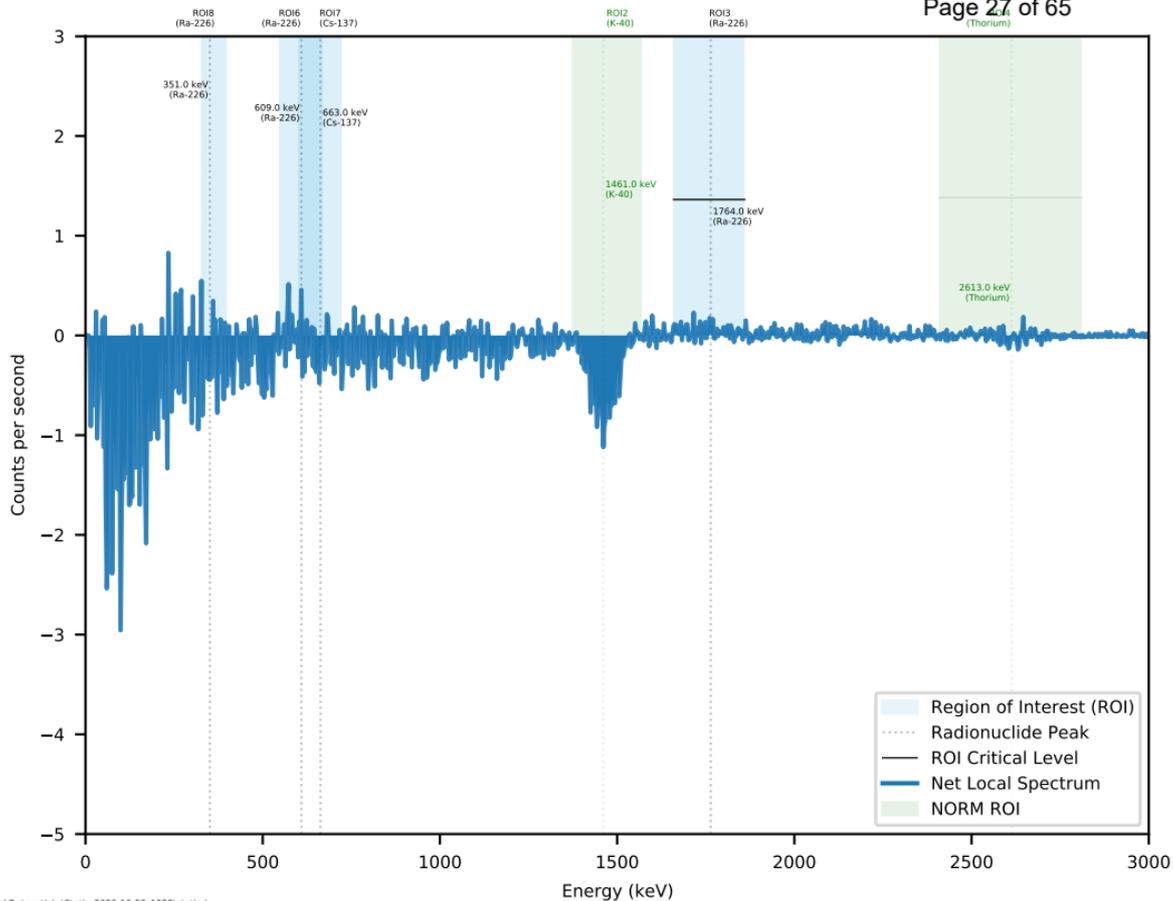


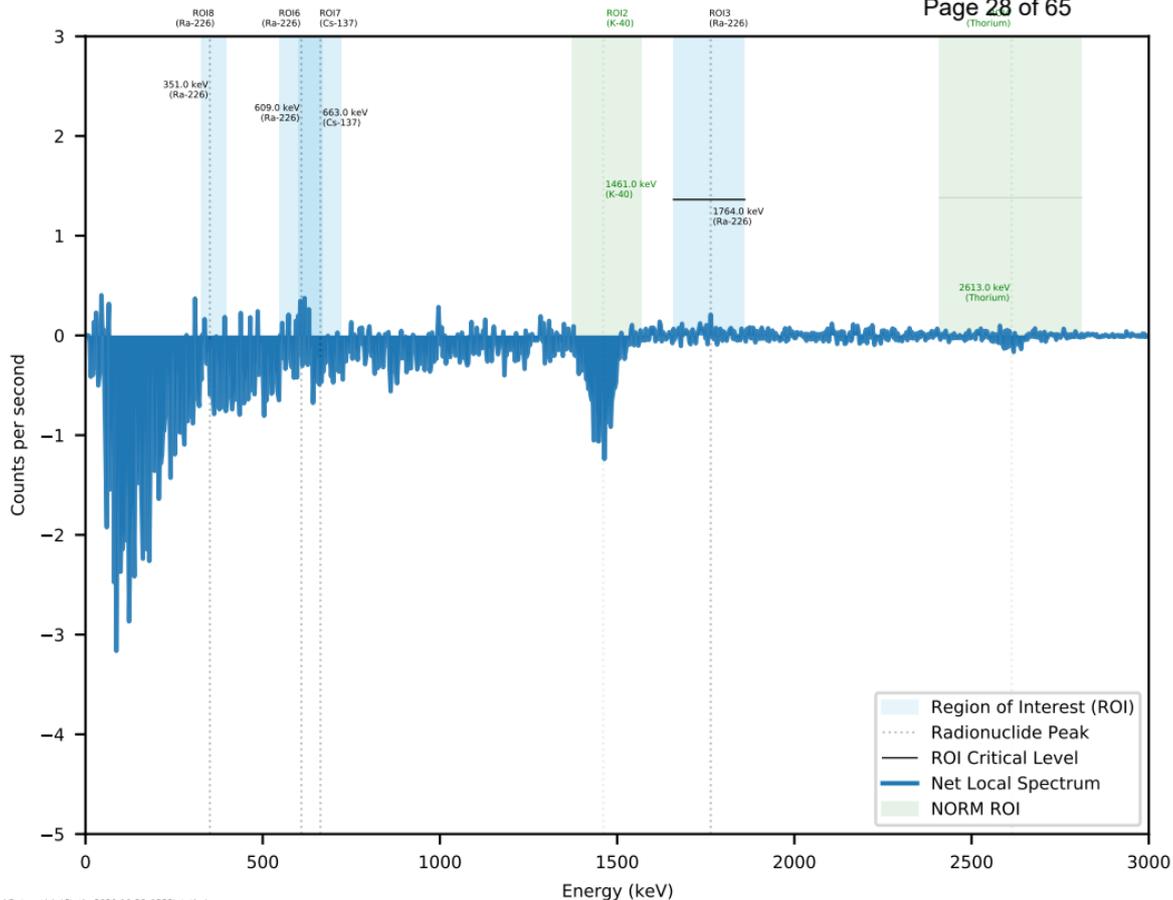


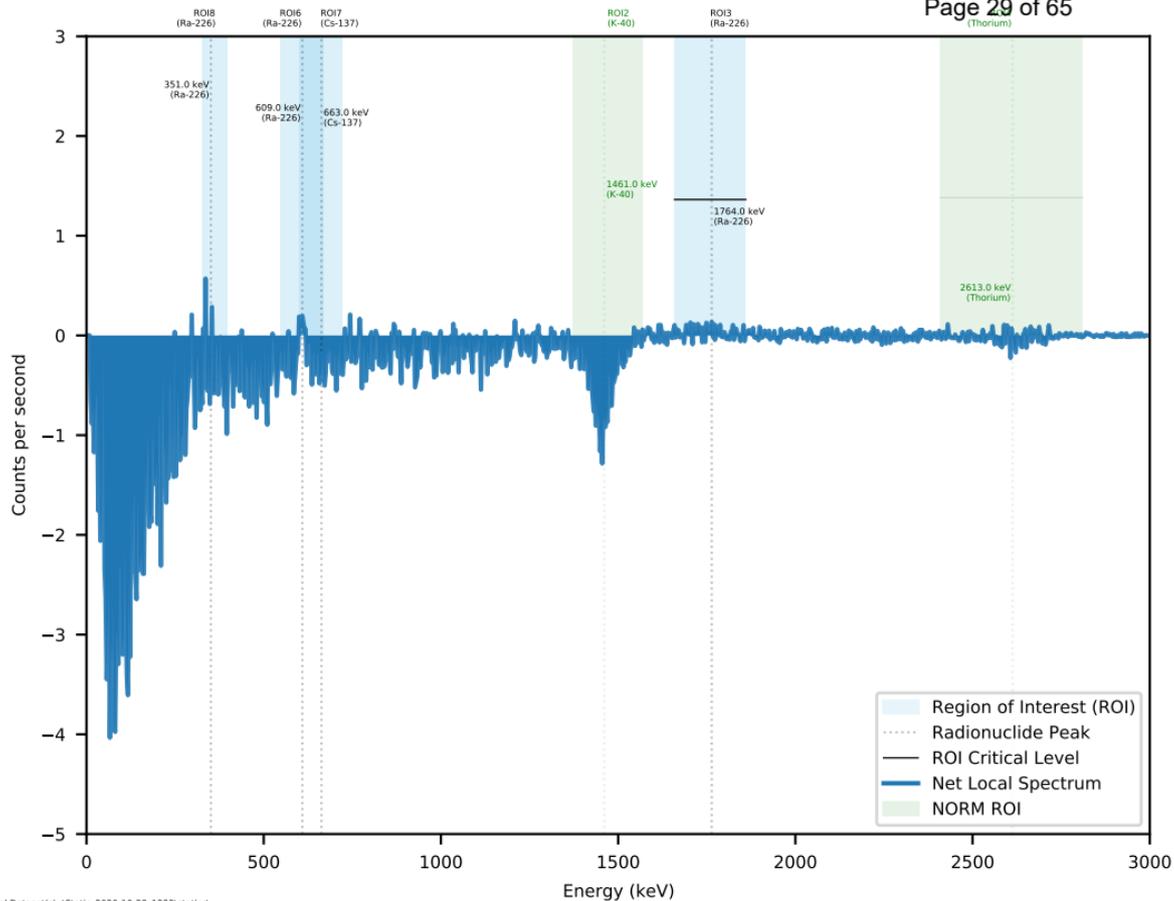


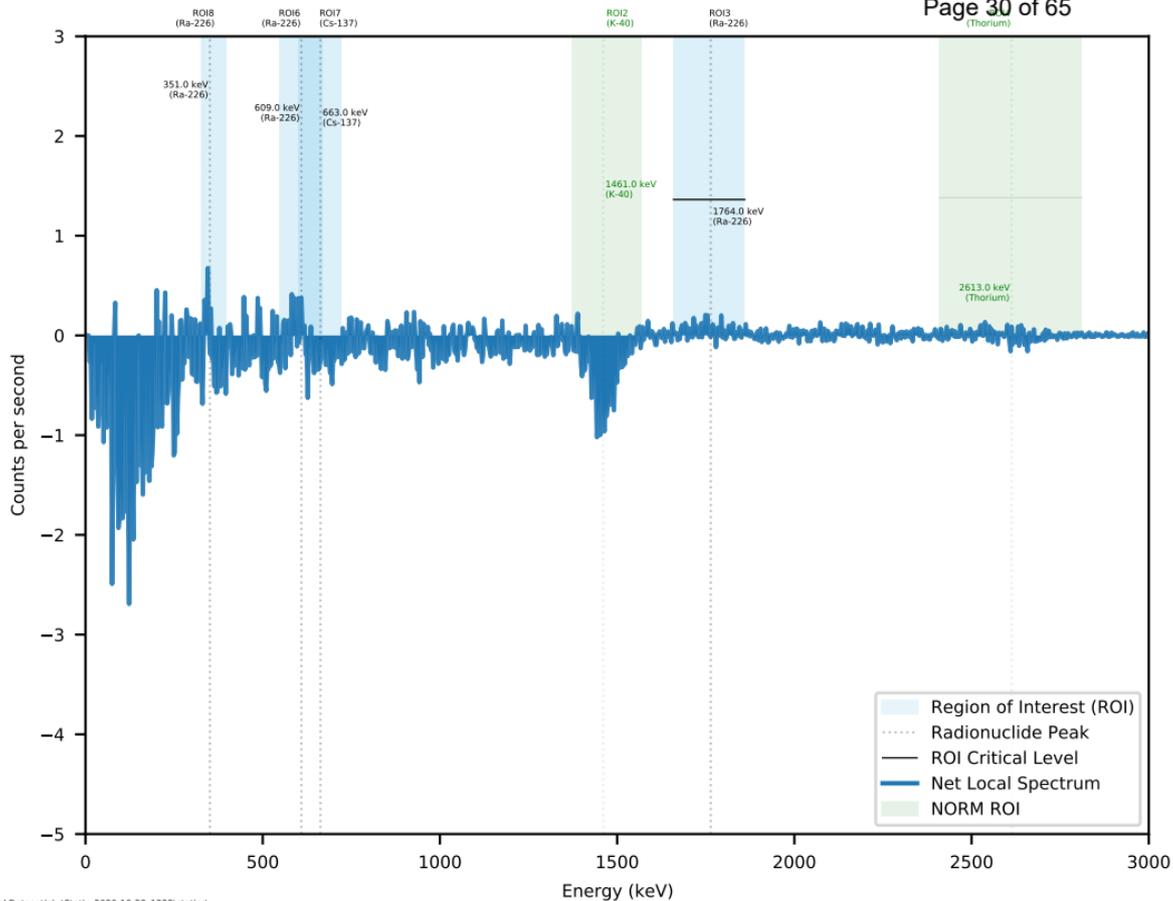














Environment Testing America

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40199-1
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/20/2021 2:44:30 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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results through
TotalAccess

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

1

2

3

4

5

6

7

8

9

10

11

12



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	6
Receipt Checklists	10
Definitions/Glossary	11
Method Summary	12
Sample Summary	13
Client Sample Results	14
QC Sample Results	30
QC Association Summary	33
Tracer Carrier Summary	35

Case Narrative

Page 33 of 65

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Job ID: 160-40199-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40199-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for strontium

RECEIPT

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Job ID: 160-40199-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

The samples were received on 10/30/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 17.1 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-ESU-TU098D-001 (160-40199-1), HPPG-ESU-TU098D-011 (160-40199-11), HPPG-ESU-TU098D-021 (160-40199-21), HPPG-ESU-TU098D-B-001 (160-40199-26) and HPPG-F-023 (160-40199-27) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 11/01/2020, prepared on 11/25/2020 and analyzed on 12/11/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP:HPPG-ESU-TU098D-001 (160-40199-1), HPPG-ESU-TU098D-011 (160-40199-11), HPPG-ESU-TU098D-021 (160-40199-21), HPPG-ESU-TU098D-B-001 (160-40199-26) and HPPG-F-023 (160-40199-27).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-ESU-TU098D-001 (160-40199-1), HPPG-ESU-TU098D-002 (160-40199-2), HPPG-ESU-TU098D-003 (160-40199-3), HPPG-ESU-TU098D-004 (160-40199-4), HPPG-ESU-TU098D-005 (160-40199-5), HPPG-ESU-TU098D-006 (160-40199-6), HPPG-ESU-TU098D-007 (160-40199-7), HPPG-ESU-TU098D-008 (160-40199-8), HPPG-ESU-TU098D-009 (160-40199-9), HPPG-ESU-TU098D-010 (160-40199-10), HPPG-ESU-TU098D-011 (160-40199-11), HPPG-ESU-TU098D-012 (160-40199-12), HPPG-ESU-TU098D-013 (160-40199-13), HPPG-ESU-TU098D-014 (160-40199-14), HPPG-ESU-TU098D-015 (160-40199-15), HPPG-ESU-TU098D-016 (160-40199-16), HPPG-ESU-TU098D-017 (160-40199-17), HPPG-ESU-TU098D-018 (160-40199-18), HPPG-ESU-TU098D-019 (160-40199-19), HPPG-ESU-TU098D-020 (160-40199-20), HPPG-ESU-TU098D-021 (160-40199-21), HPPG-ESU-TU098D-022 (160-40199-22), HPPG-ESU-TU098D-023 (160-40199-23), HPPG-ESU-TU098D-024 (160-40199-24), HPPG-ESU-TU098D-025 (160-40199-25), HPPG-ESU-TU098D-B-001 (160-40199-26), HPPG-F-023 (160-40199-27) and HPPG-F-024 (160-40199-28) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 11/01/2020, prepared on 11/04/2020 and 11/05/2020 and analyzed on 11/26/2020 and 11/27/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Job ID: 160-40199-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Gamma prep batch 488430

The MB z-score for Co-60 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (MB 160-488430/1-A)

The replicate precision for Ac-228/Ra-228/Th-232 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40199-A-8-C DU)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Co-60: (MB 160-488430/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU098D-005 (160-40199-5)

Gamma prep batch 488230

The method blank (MB) z-score associated with Prep Batch 160-488230 is within limits and is stored in the level IV raw data. (MB 160-488230/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU098D-016 (160-40199-16)

The radium-226 detection goal of 0.200 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-ESU-TU098D-018 (160-40199-18)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc

CHAIN OF CUSTODY

Ref. Document # 501197RSY-022

Page 1 of 4

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/28/2020

Waybill Number: 4957 0225 4318

Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested

Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma

Strontium-90 (EPA 905 MOD)



160-40199 Chain of Custody

Sample ID	Collection Information		# of Containers	Matrix	Preservatives (water)	Preservatives (soil)	Container Type	Dose Rate uR/hr	Evidence Bag ID	Comment
	Date	Time								
HPPG-ESU-TU098D-001	10/28/2020	10:52	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-002	10/28/2020	10:52	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-003	10/28/2020	10:49	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-004	10/28/2020	10:46	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-005	10/28/2020	10:43	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-006	10/28/2020	10:55	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-007	10/28/2020	10:57	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	
HPPG-ESU-TU098D-008	10/28/2020	11:00	G	SO 1	16 oz. plastic jar		16 oz. plastic jar	5	GJ46599775	

Special Instructions:

Analyze for Total Strontium as a screening step, and Isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

21 day ingrowth results only

Turanaround Time: 3-day 10-Day 28-day Other

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquisher Signature:  Relinquish Date Time: 10/28/2020 15:59 Received By: SHIPPEDTOLAB

Received Signature:  Received Date Time: 10/30/2020 08:58

*** Last 3 transfers shown above - Complete list of transfers on last page *MICHA KORRITZER





APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Paul LeBlanc
Andrew Muirri

CHAIN OF CUSTODY

Ref. Document # 501197RSY-022

Page 2 of 4

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel
G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/28/2020

Waybill Number: 4457 0225 4318

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information		Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Analysis Requested					Evidence Bag ID	Comment
	Date	Time						Method	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)				
HPPG-ESU-TU098D-009	10/28/2020	11:05	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-010	10/28/2020	11:08	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-011	10/28/2020	11:01	G	SO	1	16 oz. plastic jar			X	X			GJ46599775	
HPPG-ESU-TU098D-012	10/28/2020	11:04	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-013	10/28/2020	11:14	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-014	10/28/2020	11:18	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-015	10/28/2020	11:16	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-016	10/28/2020	11:07	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-017	10/28/2020	11:10	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-018	10/28/2020	11:19	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-019	10/28/2020	11:16	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-020	10/28/2020	11:20	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-021	10/28/2020	11:21	G	SO	1	16 oz. plastic jar			X	X			GJ46599775	
HPPG-ESU-TU098D-022	10/28/2020	11:24	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-023	10/28/2020	11:28	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-024	10/28/2020	11:25	G	SO	1	16 oz. plastic jar			X				GJ46599775	
HPPG-ESU-TU098D-025	10/28/2020	11:31	G	SO	1	16 oz. plastic jar			X				GJ46599775	





APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin
Sample Tech(s): Paul LeBlanc
Andrew Murri

CHAIN OF CUSTODY

Ref. Document # 501197RSY-022

Page 3 of 4

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/28/2020
Waybill Number: 4957 0225 4318
Lab Destination: Test America (St. Louis Lab)
 13715 Rider Trail North
 Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information		Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Evidence Bag ID	Dose Rate uR/Hr	Comment
	Date	Time								
HPPG-ESU-TU098D-B-001	10/28/2020	11:52	G	SO	1	16 oz. plastic jar	X	Gj46599775	5	
HPPG-F-023	10/28/2020	10:52	G	SO	1	16 oz. plastic jar	X	Gj46599775	5	
HPPG-F-024	10/28/2020	10:49	G	SO	1	16 oz. plastic jar	X	Gj46599775	5	

Analysis Requested	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Dose Rate uR/Hr	Evidence Bag ID	Comment



All Transfers for COC 501197RSY-022

Page 4 of 4

Relinquished By: Lewis, Devin	Relinquisher Signature: 	Relinquish Date Time: 10/28/2020 15:59	Received By: SHIPPEDTOLAB	Received Signature:	Receive Date Time:
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Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40199-1

Login Number: 40199**List Source: Eurofins TestAmerica, St. Louis****List Number: 1****Creator: Hoerchler, Elizabeth M**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566



Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40199-1	HPPG-ESU-TU098D-001	Solid	10/28/20 10:52	10/30/20 08:58	
160-40199-2	HPPG-ESU-TU098D-002	Solid	10/28/20 10:52	10/30/20 08:58	
160-40199-3	HPPG-ESU-TU098D-003	Solid	10/28/20 10:49	10/30/20 08:58	
160-40199-4	HPPG-ESU-TU098D-004	Solid	10/28/20 10:46	10/30/20 08:58	
160-40199-5	HPPG-ESU-TU098D-005	Solid	10/28/20 10:43	10/30/20 08:58	
160-40199-6	HPPG-ESU-TU098D-006	Solid	10/28/20 10:55	10/30/20 08:58	
160-40199-7	HPPG-ESU-TU098D-007	Solid	10/28/20 10:57	10/30/20 08:58	
160-40199-8	HPPG-ESU-TU098D-008	Solid	10/28/20 11:00	10/30/20 08:58	
160-40199-9	HPPG-ESU-TU098D-009	Solid	10/28/20 11:05	10/30/20 08:58	
160-40199-10	HPPG-ESU-TU098D-010	Solid	10/28/20 11:08	10/30/20 08:58	
160-40199-11	HPPG-ESU-TU098D-011	Solid	10/28/20 11:01	10/30/20 08:58	
160-40199-12	HPPG-ESU-TU098D-012	Solid	10/28/20 11:04	10/30/20 08:58	
160-40199-13	HPPG-ESU-TU098D-013	Solid	10/28/20 11:14	10/30/20 08:58	
160-40199-14	HPPG-ESU-TU098D-014	Solid	10/28/20 11:18	10/30/20 08:58	
160-40199-15	HPPG-ESU-TU098D-015	Solid	10/28/20 11:16	10/30/20 08:58	
160-40199-16	HPPG-ESU-TU098D-016	Solid	10/28/20 11:07	10/30/20 08:58	
160-40199-17	HPPG-ESU-TU098D-017	Solid	10/28/20 11:10	10/30/20 08:58	
160-40199-18	HPPG-ESU-TU098D-018	Solid	10/28/20 11:19	10/30/20 08:58	
160-40199-19	HPPG-ESU-TU098D-019	Solid	10/28/20 11:16	10/30/20 08:58	
160-40199-20	HPPG-ESU-TU098D-020	Solid	10/28/20 11:20	10/30/20 08:58	
160-40199-21	HPPG-ESU-TU098D-021	Solid	10/28/20 11:21	10/30/20 08:58	
160-40199-22	HPPG-ESU-TU098D-022	Solid	10/28/20 11:24	10/30/20 08:58	
160-40199-23	HPPG-ESU-TU098D-023	Solid	10/28/20 11:28	10/30/20 08:58	
160-40199-24	HPPG-ESU-TU098D-024	Solid	10/28/20 11:25	10/30/20 08:58	
160-40199-25	HPPG-ESU-TU098D-025	Solid	10/28/20 11:31	10/30/20 08:58	
160-40199-26	HPPG-ESU-TU098D-B-001	Solid	10/28/20 11:52	10/30/20 08:58	
160-40199-27	HPPG-F-023	Solid	10/28/20 10:52	10/30/20 08:58	
160-40199-28	HPPG-F-024	Solid	10/28/20 10:49	10/30/20 08:58	

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-001

Lab Sample ID: 160-40199-1

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0362	U	0.0552	0.0553	0.160	0.0424	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	103		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.576		0.306	0.311		0.130	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Actinium-227	-0.302	U	0.666	0.667		0.401	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Bismuth-212	0.506	U	0.851	0.853		0.654	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Bismuth-214	0.536		0.150	0.159		0.0593	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Cesium-137	0.0136	U	0.0574	0.0575	0.0700	0.0458	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Lead-210	0.776	U	1.78	1.79		1.18	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Lead-212	0.543		0.105	0.119		0.0469	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Lead-214	0.538		0.149	0.158		0.0637	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Potassium-40	9.50		1.46	1.74		0.130	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Protactinium-231	-1.03	U	3.42	3.42		2.79	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Protactinium-234	-0.0607	U	0.335	0.335		0.274	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Radium-226	0.536		0.150	0.159	0.200	0.0593	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Radium-228	0.576		0.306	0.311		0.130	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Thallium-208	0.243		0.0797	0.0834		0.0300	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Thorium 228	0.543		0.105	0.119		0.0469	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Thorium-232	0.576		0.306	0.311		0.130	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Thorium-234	-0.240	U	1.15	1.15		0.953	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Uranium-235	0.000	U	0.217	0.217		0.467	pCi/g	11/05/20 19:07	11/27/20 20:47	1
Uranium-238	-0.240	U	1.15	1.15		0.953	pCi/g	11/05/20 19:07	11/27/20 20:47	1

Client Sample ID: HPPG-ESU-TU098D-002

Lab Sample ID: 160-40199-2

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.403		0.198	0.202		0.0826	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Actinium-227	-0.0144	U	0.0674	0.0674		0.288	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Bismuth-212	-0.232	U	0.673	0.674		0.538	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Bismuth-214	0.543		0.137	0.148		0.0532	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Cesium-137	-0.0382	U	0.0618	0.0620	0.0700	0.0484	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Lead-210	-0.137	U	1.03	1.03		0.837	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Lead-212	0.448		0.0727	0.0930		0.0279	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Lead-214	0.399		0.0999	0.108		0.0404	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Potassium-40	8.89		1.13	1.45		0.0842	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Protactinium-231	0.607	U	1.46	1.46		1.60	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Protactinium-234	-0.0866	U	0.247	0.247		0.201	pCi/g	11/05/20 19:07	11/27/20 20:50	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-002

Lab Sample ID: 160-40199-2

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.543		0.137	0.148	0.200	0.0532	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Radium-228	0.403		0.198	0.202		0.0826	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Thallium-208	0.169		0.0502	0.0532		0.0157	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Thorium 228	0.448		0.0727	0.0930		0.0279	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Thorium-232	0.403		0.198	0.202		0.0826	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Thorium-234	0.272	U	0.664	0.665		0.775	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Uranium-235	0.0453	U	0.206	0.206		0.312	pCi/g	11/05/20 19:07	11/27/20 20:50	1
Uranium-238	0.272	U	0.664	0.665		0.775	pCi/g	11/05/20 19:07	11/27/20 20:50	1

Client Sample ID: HPPG-ESU-TU098D-003

Lab Sample ID: 160-40199-3

Date Collected: 10/28/20 10:49

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.338		0.151	0.155		0.137	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Actinium-227	0.227	U	0.342	0.343		0.252	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Bismuth-212	0.385	U	0.796	0.797		0.617	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Bismuth-214	0.437		0.138	0.145		0.0526	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Cesium-137	-0.0258	U	0.0665	0.0665	0.0700	0.0522	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Lead-210	-0.340	U	1.84	1.84		1.52	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Lead-212	0.401		0.107	0.119		0.0629	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Lead-214	0.459		0.124	0.133		0.0436	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Potassium-40	8.19		1.41	1.64		0.142	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Protactinium-231	0.000	U	0.810	0.810		2.69	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Protactinium-234	-0.0231	U	0.0613	0.0613		0.247	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Radium-226	0.437		0.138	0.145	0.200	0.0526	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Radium-228	0.338		0.151	0.155		0.137	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Thallium-208	0.139		0.0656	0.0672		0.0281	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Thorium 228	0.401		0.107	0.119		0.0629	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Thorium-232	0.338		0.151	0.155		0.137	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Thorium-234	-0.963	U	0.817	0.824		0.960	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Uranium-235	0.102	U	0.213	0.213		0.441	pCi/g	11/05/20 19:07	11/27/20 20:49	1
Uranium-238	-0.963	U	0.817	0.824		0.960	pCi/g	11/05/20 19:07	11/27/20 20:49	1

Client Sample ID: HPPG-ESU-TU098D-004

Lab Sample ID: 160-40199-4

Date Collected: 10/28/20 10:46

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.341		0.383	0.385		0.194	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Actinium-227	0.143	U	0.490	0.490		0.408	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Bismuth-212	0.483	U	1.04	1.04		0.817	pCi/g	11/05/20 19:07	11/27/20 20:52	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-004

Lab Sample ID: 160-40199-4

Date Collected: 10/28/20 10:46

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.527		0.151	0.163		0.0532	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Cesium-137	0.0219	U	0.0634	0.0635	0.0700	0.0497	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-210	0.759	U	1.35	1.36		1.05	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-212	0.428		0.111	0.122		0.0633	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-214	0.466		0.152	0.161		0.0701	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Potassium-40	7.55		1.41	1.65		0.299	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Protactinium-231	0.000	U	0.428	0.428		2.46	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Protactinium-234	0.0112	U	0.0199	0.0200		0.319	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Radium-226	0.527		0.151	0.163	0.200	0.0532	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Radium-228	0.341		0.383	0.385		0.194	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thallium-208	0.117		0.0584	0.0599		0.0264	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium 228	0.428		0.111	0.122		0.0633	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium-232	0.341		0.383	0.385		0.194	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium-234	-0.559	U	1.02	1.02		0.948	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Uranium-235	0.101	U	0.697	0.697		0.572	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Uranium-238	-0.559	U	1.02	1.02		0.948	pCi/g	11/05/20 19:07	11/27/20 20:52	1

Client Sample ID: HPPG-ESU-TU098D-005

Lab Sample ID: 160-40199-5

Date Collected: 10/28/20 10:43

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.748		0.214	0.227		0.0370	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Actinium-227	0.0615	U	0.379	0.379		0.313	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Bismuth-212	-0.613	U	1.14	1.14		0.894	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Bismuth-214	0.652		0.141	0.155		0.0302	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Cesium-137	-0.0621	U	0.0647	0.0650	0.0700	0.0779	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-210	0.438	U	1.58	1.58		1.27	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-212	0.471		0.0925	0.105		0.0410	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-214	0.403		0.118	0.125		0.0573	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Potassium-40	7.12		1.39	1.57		0.230	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Protactinium-231	0.789	U	2.00	2.00		2.19	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Protactinium-234	0.0732	U	0.227	0.227		0.197	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Radium-226	0.652		0.141	0.155	0.200	0.0302	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Radium-228	0.748		0.214	0.227		0.0370	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thallium-208	0.152		0.0610	0.0629		0.0231	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium 228	0.471		0.0925	0.105		0.0410	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium-232	0.748		0.214	0.227		0.0370	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium-234	-0.194	U	1.03	1.03		0.854	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Uranium-235	-0.0377	U	0.0695	0.0696		0.387	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Uranium-238	-0.194	U	1.03	1.03		0.854	pCi/g	11/05/20 19:07	11/27/20 21:22	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-006

Lab Sample ID: 160-40199-6

Date Collected: 10/28/20 10:55

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.373		0.272	0.274		0.152	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Actinium-227	0.0760	U	0.333	0.333		0.369	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Bismuth-212	-0.118	U	0.767	0.767		0.621	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Bismuth-214	0.403		0.124	0.131		0.0479	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Cesium-137	0.0258	U	0.0600	0.0601	0.0700	0.0469	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Lead-210	0.328	U	1.38	1.38		0.966	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Lead-212	0.492		0.103	0.122		0.0531	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Lead-214	0.477		0.115	0.125		0.0523	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Potassium-40	8.62		1.37	1.63		0.307	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Protactinium-231	-0.874	U	3.09	3.09		2.52	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Protactinium-234	0.0677	U	0.106	0.106		0.184	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Radium-226	0.403		0.124	0.131	0.200	0.0479	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Radium-228	0.373		0.272	0.274		0.152	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Thallium-208	0.150		0.0826	0.0841		0.0421	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Thorium 228	0.492		0.103	0.122		0.0531	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Thorium-232	0.373		0.272	0.274		0.152	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Thorium-234	0.575		0.523	0.527		0.420	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Uranium-235	-0.0215	U	0.0316	0.0316		0.313	pCi/g	11/05/20 19:07	11/27/20 21:25	1
Uranium-238	0.575		0.523	0.527		0.420	pCi/g	11/05/20 19:07	11/27/20 21:25	1

Client Sample ID: HPPG-ESU-TU098D-007

Lab Sample ID: 160-40199-7

Date Collected: 10/28/20 10:57

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.532		0.318	0.323		0.137	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Actinium-227	-0.0178	U	0.0309	0.0310		0.452	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Bismuth-212	0.287	U	0.997	0.997		0.792	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Bismuth-214	0.357		0.136	0.141		0.0610	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Cesium-137	-0.0226	U	0.0863	0.0863	0.0700	0.0672	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-210	1.70		1.36	1.38		0.782	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-212	0.472		0.109	0.125		0.0523	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Lead-214	0.542		0.146	0.156		0.0694	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Potassium-40	7.46		1.75	1.91		0.506	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Protactinium-231	-0.865	U	3.01	3.02		2.45	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Protactinium-234	-0.108	U	0.116	0.116		0.223	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Radium-226	0.357		0.136	0.141	0.200	0.0610	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Radium-228	0.532		0.318	0.323		0.137	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thallium-208	0.244		0.0741	0.0783		0.0204	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium 228	0.472		0.109	0.125		0.0523	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium-232	0.532		0.318	0.323		0.137	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Thorium-234	0.443		0.493	0.496		0.391	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Uranium-235	-0.185	U	0.204	0.205		0.341	pCi/g	11/05/20 19:07	11/27/20 21:22	1
Uranium-238	0.443		0.493	0.496		0.391	pCi/g	11/05/20 19:07	11/27/20 21:22	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-008

Lab Sample ID: 160-40199-8

Date Collected: 10/28/20 11:00

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.142	U	0.237	0.237		0.171	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Actinium-227	0.124	U	0.400	0.400		0.388	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Bismuth-212	0.439	U	0.813	0.815		0.635	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Bismuth-214	0.462		0.140	0.148		0.0557	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Cesium-137	-0.00161	U	0.0551	0.0551	0.0700	0.0313	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-210	-1.74	U	1.42	1.44		1.46	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-212	0.347		0.0949	0.105		0.0566	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Lead-214	0.442		0.126	0.134		0.0687	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Potassium-40	9.02		1.35	1.63		0.282	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Protactinium-231	0.351	U	1.43	1.43		2.22	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Protactinium-234	0.0634	U	0.225	0.225		0.228	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Radium-226	0.462		0.140	0.148	0.200	0.0557	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Radium-228	0.142	U	0.237	0.237		0.171	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thallium-208	0.121		0.0701	0.0712		0.0349	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium 228	0.347		0.0949	0.105		0.0566	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium-232	0.142	U	0.237	0.237		0.171	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Thorium-234	-0.321	U	0.751	0.751		0.522	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Uranium-235	-0.156	U	0.491	0.491		0.399	pCi/g	11/05/20 19:07	11/27/20 20:52	1
Uranium-238	-0.321	U	0.751	0.751		0.522	pCi/g	11/05/20 19:07	11/27/20 20:52	1

Client Sample ID: HPPG-ESU-TU098D-009

Lab Sample ID: 160-40199-9

Date Collected: 10/28/20 11:05

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.410		0.131	0.138		0.0798	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Actinium-227	-0.294	U	0.556	0.557		0.381	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Bismuth-212	0.410	U	0.755	0.756		0.589	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Bismuth-214	0.379		0.109	0.116		0.0504	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Cesium-137	-0.0113	U	0.0521	0.0521	0.0700	0.0418	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Lead-210	-1.70	U	1.13	1.15		1.53	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Lead-212	0.480		0.0851	0.105		0.0342	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Lead-214	0.356		0.101	0.108		0.0448	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Potassium-40	6.72		1.13	1.33		0.264	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Protactinium-231	0.511	U	1.62	1.63		1.78	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Protactinium-234	0.0371	U	0.0682	0.0683		0.257	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Radium-226	0.379		0.109	0.116	0.200	0.0504	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Radium-228	0.410		0.131	0.138		0.0798	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Thallium-208	0.208		0.0648	0.0683		0.0236	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Thorium 228	0.480		0.0851	0.105		0.0342	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Thorium-232	0.410		0.131	0.138		0.0798	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Thorium-234	0.312	U	0.522	0.523		0.412	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Uranium-235	-0.183	U	0.599	0.600		0.490	pCi/g	11/04/20 18:40	11/26/20 19:08	1
Uranium-238	0.312	U	0.522	0.523		0.412	pCi/g	11/04/20 18:40	11/26/20 19:08	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-010

Lab Sample ID: 160-40199-10

Date Collected: 10/28/20 11:08

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.395		0.146	0.151		0.0497	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Actinium-227	-0.0469	U	0.522	0.522		0.309	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Bismuth-212	0.211	U	0.534	0.535		0.420	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Bismuth-214	0.441		0.109	0.118		0.0414	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Cesium-137	0.0196	U	0.0391	0.0392	0.0700	0.0301	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Lead-210	0.564	U	1.06	1.07		0.845	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Lead-212	0.461		0.0751	0.0959		0.0286	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Lead-214	0.452		0.0954	0.106		0.0477	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Potassium-40	8.02		1.10	1.37		0.0877	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Protactinium-231	0.000	U	0.270	0.270		1.85	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Protactinium-234	0.0247	U	0.0419	0.0420		0.203	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Radium-226	0.441		0.109	0.118	0.200	0.0414	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Radium-228	0.395		0.146	0.151		0.0497	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Thallium-208	0.198		0.0427	0.0474		0.00543	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Thorium 228	0.461		0.0751	0.0959		0.0286	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Thorium-232	0.395		0.146	0.151		0.0497	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Thorium-234	0.315		0.399	0.400		0.310	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Uranium-235	-0.172	U	0.497	0.497		0.405	pCi/g	11/04/20 18:40	11/26/20 19:07	1
Uranium-238	0.315		0.399	0.400		0.310	pCi/g	11/04/20 18:40	11/26/20 19:07	1

Client Sample ID: HPPG-ESU-TU098D-011

Lab Sample ID: 160-40199-11

Date Collected: 10/28/20 11:01

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0105	U	0.0531	0.0531	0.160	0.0445	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	102		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.449		0.141	0.149		0.0396	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Actinium-227	0.0381	U	0.146	0.146		0.301	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Bismuth-212	0.430	U	0.773	0.774		0.607	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Bismuth-214	0.457		0.113	0.123		0.0411	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Cesium-137	-0.0321	U	0.0563	0.0564	0.0700	0.0439	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Lead-210	-0.293	U	1.36	1.36		1.11	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Lead-212	0.338		0.0772	0.0888		0.0417	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Lead-214	0.407		0.0845	0.0945		0.0460	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Potassium-40	6.72		1.07	1.27		0.253	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Protactinium-231	0.407	U	1.57	1.57		1.74	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Protactinium-234	0.0998	U	0.0815	0.0821		0.184	pCi/g	11/04/20 18:40	11/27/20 11:23	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-011

Lab Sample ID: 160-40199-11

Date Collected: 10/28/20 11:01

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.457		0.113	0.123	0.200	0.0411	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Radium-228	0.449		0.141	0.149		0.0396	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Thallium-208	0.184		0.0468	0.0505		0.0122	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Thorium 228	0.338		0.0772	0.0888		0.0417	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Thorium-232	0.449		0.141	0.149		0.0396	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Thorium-234	-0.362	U	0.404	0.406		0.958	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Uranium-235	0.270	U	0.281	0.282		0.355	pCi/g	11/04/20 18:40	11/27/20 11:23	1
Uranium-238	-0.362	U	0.404	0.406		0.958	pCi/g	11/04/20 18:40	11/27/20 11:23	1

Client Sample ID: HPPG-ESU-TU098D-012

Lab Sample ID: 160-40199-12

Date Collected: 10/28/20 11:04

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.558		0.122	0.134		0.0223	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Actinium-227	0.0179	U	0.0416	0.0416		0.283	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Bismuth-212	-0.221	U	0.730	0.730		0.585	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Bismuth-214	0.343		0.0899	0.0967		0.0350	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Cesium-137	0.0127	U	0.0604	0.0604	0.0700	0.0488	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Lead-210	0.471	U	1.00	1.00		0.798	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Lead-212	0.458		0.0754	0.0959		0.0292	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Lead-214	0.400		0.0995	0.108		0.0418	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Potassium-40	7.55		1.07	1.32		0.0879	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Protactinium-231	0.000	U	0.484	0.484		1.71	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Protactinium-234	-0.0415	U	0.115	0.115		0.214	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Radium-226	0.343		0.0899	0.0967	0.200	0.0350	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Radium-228	0.558		0.122	0.134		0.0223	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Thallium-208	0.159		0.0542	0.0566		0.0217	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Thorium 228	0.458		0.0754	0.0959		0.0292	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Thorium-232	0.558		0.122	0.134		0.0223	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Thorium-234	0.205	U	0.415	0.416		0.826	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Uranium-235	0.0885	U	0.179	0.179		0.381	pCi/g	11/04/20 18:40	11/27/20 11:25	1
Uranium-238	0.205	U	0.415	0.416		0.826	pCi/g	11/04/20 18:40	11/27/20 11:25	1

Client Sample ID: HPPG-ESU-TU098D-013

Lab Sample ID: 160-40199-13

Date Collected: 10/28/20 11:14

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.591		0.194	0.203		0.138	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Actinium-227	-0.108	U	0.598	0.598		0.363	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Bismuth-212	0.248	U	0.723	0.724		0.567	pCi/g	11/04/20 18:40	11/27/20 11:31	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-013

Lab Sample ID: 160-40199-13

Date Collected: 10/28/20 11:14

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.329		0.114	0.119		0.0497	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Cesium-137	0.0250	U	0.0573	0.0573	0.0700	0.0441	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Lead-210	0.990		1.46	1.46		0.950	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Lead-212	0.428		0.0906	0.101		0.0429	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Lead-214	0.419		0.121	0.128		0.102	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Potassium-40	9.21		1.57	1.83		0.228	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Protactinium-231	0.000	U	0.503	0.503		2.25	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Protactinium-234	0.0761	U	0.236	0.236		0.210	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Radium-226	0.329		0.114	0.119	0.200	0.0497	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Radium-228	0.591		0.194	0.203		0.138	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Thallium-208	0.227		0.0631	0.0672		0.0159	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Thorium 228	0.428		0.0906	0.101		0.0429	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Thorium-232	0.591		0.194	0.203		0.138	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Thorium-234	0.326	U	0.543	0.544		0.427	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Uranium-235	-0.216	U	0.195	0.196		0.430	pCi/g	11/04/20 18:40	11/27/20 11:31	1
Uranium-238	0.326	U	0.543	0.544		0.427	pCi/g	11/04/20 18:40	11/27/20 11:31	1

Client Sample ID: HPPG-ESU-TU098D-014

Lab Sample ID: 160-40199-14

Date Collected: 10/28/20 11:18

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.355		0.199	0.202		0.0832	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Actinium-227	0.196	U	0.285	0.286		0.304	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Bismuth-212	-0.583	U	0.943	0.945		0.740	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Bismuth-214	0.103	U	0.101	0.101		0.183	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Cesium-137	-0.00490	U	0.0672	0.0672	0.0700	0.0381	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Lead-210	0.506	U	1.26	1.26		0.841	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Lead-212	0.406		0.0812	0.0967		0.0367	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Lead-214	0.186		0.116	0.118		0.0833	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Potassium-40	4.34		0.922	1.02		0.262	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Protactinium-231	0.331	U	1.23	1.23		1.92	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Protactinium-234	-0.0194	U	0.0432	0.0432		0.163	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Radium-226	0.103	U	0.101	0.101	0.200	0.183	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Radium-228	0.355		0.199	0.202		0.0832	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Thallium-208	0.168		0.0548	0.0575		0.0203	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Thorium 228	0.406		0.0812	0.0967		0.0367	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Thorium-232	0.355		0.199	0.202		0.0832	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Thorium-234	0.338		0.416	0.418		0.322	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Uranium-235	0.0700	U	0.269	0.269		0.222	pCi/g	11/04/20 18:40	11/27/20 11:34	1
Uranium-238	0.338		0.416	0.418		0.322	pCi/g	11/04/20 18:40	11/27/20 11:34	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-015

Lab Sample ID: 160-40199-15

Date Collected: 10/28/20 11:16

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.605		0.217	0.226		0.130	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Actinium-227	0.124	U	0.428	0.428		0.363	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Bismuth-212	-0.687	U	1.18	1.18		0.917	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Bismuth-214	0.436		0.164	0.170		0.0718	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Cesium-137	0.00978	U	0.0676	0.0676	0.0700	0.0542	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Lead-210	0.448	U	1.16	1.16		0.785	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Lead-212	0.433		0.0997	0.114		0.0460	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Lead-214	0.409		0.130	0.137		0.0548	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Potassium-40	6.51		1.42	1.56		0.281	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Protactinium-231	0.317	U	1.37	1.37		2.07	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Protactinium-234	-0.0910	U	0.243	0.243		0.188	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Radium-226	0.436		0.164	0.170	0.200	0.0718	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Radium-228	0.605		0.217	0.226		0.130	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Thallium-208	0.156		0.0697	0.0715		0.0290	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Thorium 228	0.433		0.0997	0.114		0.0460	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Thorium-232	0.605		0.217	0.226		0.130	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Thorium-234	-0.0977	U	0.883	0.883		0.729	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Uranium-235	0.115	U	0.341	0.341		0.275	pCi/g	11/04/20 18:40	11/27/20 11:32	1
Uranium-238	-0.0977	U	0.883	0.883		0.729	pCi/g	11/04/20 18:40	11/27/20 11:32	1

Client Sample ID: HPPG-ESU-TU098D-016

Lab Sample ID: 160-40199-16

Date Collected: 10/28/20 11:07

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.423		0.194	0.199		0.113	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Actinium-227	0.0964	U	0.294	0.294		0.352	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Bismuth-212	0.322	U	1.07	1.07		0.856	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Bismuth-214	0.435		0.123	0.130		0.0398	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Cesium-137	-0.0466	U	0.0654	0.0656	0.0700	0.0705	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Lead-210	2.41		1.72	1.75		1.00	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Lead-212	0.470		0.0859	0.0989		0.0299	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Lead-214	0.446		0.102	0.111		0.0506	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Potassium-40	8.67		1.53	1.76		0.229	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Protactinium-231	-0.803	U	2.74	2.74		2.22	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Protactinium-234	0.132	U	0.264	0.265		0.216	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Radium-226	0.435		0.123	0.130	0.200	0.0398	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Radium-228	0.423		0.194	0.199		0.113	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Thallium-208	0.221		0.0735	0.0769		0.0216	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Thorium 228	0.470		0.0859	0.0989		0.0299	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Thorium-232	0.423		0.194	0.199		0.113	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Thorium-234	0.721		0.587	0.592		0.407	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Uranium-235	-0.0438	U	0.284	0.284		0.384	pCi/g	11/04/20 18:40	11/27/20 12:06	1
Uranium-238	0.721		0.587	0.592		0.407	pCi/g	11/04/20 18:40	11/27/20 12:06	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-017

Lab Sample ID: 160-40199-17

Date Collected: 10/28/20 11:10

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.301		0.187	0.190		0.0803	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Actinium-227	-0.105	U	0.444	0.444		0.271	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Bismuth-212	0.000	U	0.307	0.307		0.312	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Bismuth-214	0.294		0.101	0.106		0.0405	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Cesium-137	-0.000945	U	0.0489	0.0489	0.0700	0.0402	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Lead-210	0.405	U	1.03	1.03		0.711	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Lead-212	0.302		0.0732	0.0830		0.0371	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Lead-214	0.297		0.0953	0.100		0.0407	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Potassium-40	5.06		0.968	1.10		0.253	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Protactinium-231	-0.720	U	2.52	2.53		2.06	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Protactinium-234	0.0234	U	0.165	0.165		0.135	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Radium-226	0.294		0.101	0.106	0.200	0.0405	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Radium-228	0.301		0.187	0.190		0.0803	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Thallium-208	0.111		0.0627	0.0637		0.0269	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Thorium 228	0.302		0.0732	0.0830		0.0371	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Thorium-232	0.301		0.187	0.190		0.0803	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Thorium-234	0.465		0.391	0.395		0.313	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Uranium-235	0.0643	U	0.153	0.153		0.262	pCi/g	11/04/20 18:40	11/27/20 12:13	1
Uranium-238	0.465		0.391	0.395		0.313	pCi/g	11/04/20 18:40	11/27/20 12:13	1

Client Sample ID: HPPG-ESU-TU098D-018

Lab Sample ID: 160-40199-18

Date Collected: 10/28/20 11:19

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.395		0.169	0.174		0.0918	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Actinium-227	0.229	U	0.499	0.499		0.296	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Bismuth-212	-0.397	U	0.963	0.964		0.754	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Bismuth-214	0.152	U	0.129	0.130		0.239	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Cesium-137	-0.0209	U	0.172	0.172	0.0700	0.0628	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Lead-210	0.487	U	1.26	1.26		0.867	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Lead-212	0.395		0.0903	0.104		0.0376	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Lead-214	0.325		0.118	0.123		0.0989	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Potassium-40	6.40		1.57	1.70		0.468	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Protactinium-231	0.000	U	0.625	0.625		2.08	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Protactinium-234	-0.0849	U	0.141	0.141		0.176	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Radium-226	0.152	U	0.129	0.130	0.200	0.239	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Radium-228	0.395		0.169	0.174		0.0918	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Thallium-208	0.0706		0.0758	0.0762		0.0436	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Thorium 228	0.395		0.0903	0.104		0.0376	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Thorium-232	0.395		0.169	0.174		0.0918	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Thorium-234	0.800		0.583	0.589		0.338	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Uranium-235	0.0832	U	0.209	0.209		0.239	pCi/g	11/04/20 18:40	11/27/20 12:08	1
Uranium-238	0.800		0.583	0.589		0.338	pCi/g	11/04/20 18:40	11/27/20 12:08	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-019

Lab Sample ID: 160-40199-19

Date Collected: 10/28/20 11:16

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.589		0.136	0.149		0.0404	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Actinium-227	-0.132	U	0.583	0.583		0.343	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Bismuth-212	0.179	U	0.339	0.339		0.249	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Bismuth-214	0.402		0.104	0.112		0.0400	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Cesium-137	0.0202	U	0.0396	0.0396	0.0700	0.0303	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Lead-210	-0.745	U	1.64	1.64		1.32	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Lead-212	0.518		0.0873	0.110		0.0398	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Lead-214	0.546		0.106	0.120		0.0546	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Potassium-40	8.47		1.20	1.48		0.258	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Protactinium-231	0.000	U	0.283	0.283		1.89	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Protactinium-234	-0.0834	U	0.233	0.233		0.190	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Radium-226	0.402		0.104	0.112	0.200	0.0400	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Radium-228	0.589		0.136	0.149		0.0404	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Thallium-208	0.195		0.0449	0.0493		0.00724	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Thorium 228	0.518		0.0873	0.110		0.0398	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Thorium-232	0.589		0.136	0.149		0.0404	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Thorium-234	0.352		0.480	0.482		0.319	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Uranium-235	0.000	U	0.134	0.134		0.332	pCi/g	11/04/20 18:40	11/27/20 12:18	1
Uranium-238	0.352		0.480	0.482		0.319	pCi/g	11/04/20 18:40	11/27/20 12:18	1

Client Sample ID: HPPG-ESU-TU098D-020

Lab Sample ID: 160-40199-20

Date Collected: 10/28/20 11:20

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.505		0.330	0.334		0.148	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Actinium-227	0.193	U	0.448	0.449		0.386	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Bismuth-212	0.366	U	0.809	0.810		0.627	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Bismuth-214	0.364		0.118	0.124		0.0438	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Cesium-137	-0.0202	U	0.0865	0.0866	0.0700	0.0697	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Lead-210	-0.231	U	1.64	1.64		1.35	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Lead-212	0.364		0.108	0.118		0.0648	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Lead-214	0.349		0.120	0.125		0.0519	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Potassium-40	6.61		1.32	1.49		0.154	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Protactinium-231	0.000	U	0.457	0.457		2.32	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Protactinium-234	-0.0316	U	0.103	0.103		0.261	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Radium-226	0.364		0.118	0.124	0.200	0.0438	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Radium-228	0.505		0.330	0.334		0.148	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Thallium-208	0.159		0.0542	0.0567		0.0181	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Thorium 228	0.364		0.108	0.118		0.0648	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Thorium-232	0.505		0.330	0.334		0.148	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Thorium-234	-0.153	U	1.31	1.31		1.08	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Uranium-235	-0.00638	U	0.445	0.445		0.366	pCi/g	11/04/20 18:40	11/27/20 12:53	1
Uranium-238	-0.153	U	1.31	1.31		1.08	pCi/g	11/04/20 18:40	11/27/20 12:53	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-021

Lab Sample ID: 160-40199-21

Date Collected: 10/28/20 11:21

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0413	U	0.0675	0.0676	0.160	0.0527	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	101		40 - 110					11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.516		0.172	0.180		0.0586	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Actinium-227	0.0404	U	0.0932	0.0933		0.356	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Bismuth-212	0.0377	U	0.696	0.696		0.570	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Bismuth-214	0.376		0.102	0.109		0.0372	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Cesium-137	0.00544	U	0.0604	0.0604	0.0700	0.0493	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Lead-210	-1.34	U	1.66	1.66		1.46	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Lead-212	0.295		0.0913	0.0990		0.0571	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Lead-214	0.458		0.124	0.133		0.0592	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Potassium-40	7.11		1.19	1.39		0.274	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Protactinium-231	-0.727	U	2.17	2.17		1.76	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Protactinium-234	0.0531	U	0.285	0.285		0.233	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Radium-226	0.376		0.102	0.109	0.200	0.0372	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Radium-228	0.516		0.172	0.180		0.0586	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Thallium-208	0.194		0.0741	0.0768		0.0292	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Thorium 228	0.295		0.0913	0.0990		0.0571	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Thorium-232	0.516		0.172	0.180		0.0586	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Thorium-234	-0.893	U	0.826	0.832		0.623	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Uranium-235	0.000	U	0.195	0.195		0.397	pCi/g	11/04/20 18:40	11/27/20 12:54	1
Uranium-238	-0.893	U	0.826	0.832		0.623	pCi/g	11/04/20 18:40	11/27/20 12:54	1

Client Sample ID: HPPG-ESU-TU098D-022

Lab Sample ID: 160-40199-22

Date Collected: 10/28/20 11:24

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.455		0.118	0.126		0.0384	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Actinium-227	-0.266	U	0.549	0.550		0.317	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Bismuth-212	0.417	U	0.744	0.746		0.584	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Bismuth-214	0.382		0.114	0.120		0.0478	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Cesium-137	0.00336	U	0.0412	0.0412	0.0700	0.0336	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Lead-210	-0.770	U	1.69	1.70		1.37	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Lead-212	0.473		0.0802	0.101		0.0353	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Lead-214	0.426		0.0840	0.0949		0.0352	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Potassium-40	6.63		1.04	1.24		0.245	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Protactinium-231	0.000	U	0.564	0.564		1.78	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Protactinium-234	0.0712	U	0.204	0.204		0.166	pCi/g	11/04/20 18:40	11/27/20 12:57	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-022

Lab Sample ID: 160-40199-22

Date Collected: 10/28/20 11:24

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	0.382		0.114	0.120	0.200	0.0478	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Radium-228	0.455		0.118	0.126		0.0384	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Thallium-208	0.143		0.0733	0.0748		0.0337	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Thorium 228	0.473		0.0802	0.101		0.0353	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Thorium-232	0.455		0.118	0.126		0.0384	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Thorium-234	-0.0148	U	0.965	0.965		0.795	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Uranium-235	-0.00606	U	0.0107	0.0107		0.343	pCi/g	11/04/20 18:40	11/27/20 12:57	1
Uranium-238	-0.0148	U	0.965	0.965		0.795	pCi/g	11/04/20 18:40	11/27/20 12:57	1

Client Sample ID: HPPG-ESU-TU098D-023

Lab Sample ID: 160-40199-23

Date Collected: 10/28/20 11:28

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.492		0.272	0.277		0.117	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Actinium-227	0.230	U	0.536	0.537		0.323	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Bismuth-212	-0.0282	U	0.727	0.727		0.596	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Bismuth-214	0.494		0.153	0.161		0.0618	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Cesium-137	-0.0192	U	0.0809	0.0809	0.0700	0.0435	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Lead-210	2.24		1.68	1.70		0.897	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Lead-212	0.530		0.0923	0.108		0.0341	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Lead-214	0.478		0.123	0.133		0.0460	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Potassium-40	8.69		1.32	1.59		0.117	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Protactinium-231	0.0515	U	2.75	2.75		2.26	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Protactinium-234	-0.109	U	0.331	0.331		0.270	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Radium-226	0.494		0.153	0.161	0.200	0.0618	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Radium-228	0.492		0.272	0.277		0.117	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Thallium-208	0.158		0.0536	0.0559		0.0173	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Thorium 228	0.530		0.0923	0.108		0.0341	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Thorium-232	0.492		0.272	0.277		0.117	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Thorium-234	0.955		0.617	0.626		0.413	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Uranium-235	0.0546	U	0.255	0.255		0.490	pCi/g	11/04/20 18:40	11/27/20 13:18	1
Uranium-238	0.955		0.617	0.626		0.413	pCi/g	11/04/20 18:40	11/27/20 13:18	1

Client Sample ID: HPPG-ESU-TU098D-024

Lab Sample ID: 160-40199-24

Date Collected: 10/28/20 11:25

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.512		0.143	0.153		0.0210	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Actinium-227	-0.118	U	0.456	0.456		0.267	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Bismuth-212	0.883		0.369	0.380		0.111	pCi/g	11/04/20 18:40	11/27/20 13:19	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-024

Lab Sample ID: 160-40199-24

Date Collected: 10/28/20 11:25

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.345		0.0945	0.101		0.0383	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Cesium-137	-0.0347	U	0.0553	0.0554	0.0700	0.0430	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Lead-210	-0.169	U	1.17	1.17		0.952	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Lead-212	0.457		0.0727	0.0937		0.0277	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Lead-214	0.311		0.0763	0.0828		0.0414	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Potassium-40	6.40		0.954	1.16		0.0829	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Protactinium-231	0.000	U	0.255	0.255		1.66	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Protactinium-234	-0.0309	U	0.0574	0.0575		0.204	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Radium-226	0.345		0.0945	0.101	0.200	0.0383	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Radium-228	0.512		0.143	0.153		0.0210	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Thallium-208	0.164		0.0433	0.0466		0.0105	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Thorium 228	0.457		0.0727	0.0937		0.0277	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Thorium-232	0.512		0.143	0.153		0.0210	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Thorium-234	-0.263	U	0.943	0.943		0.770	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Uranium-235	0.0277	U	0.146	0.146		0.378	pCi/g	11/04/20 18:40	11/27/20 13:19	1
Uranium-238	-0.263	U	0.943	0.943		0.770	pCi/g	11/04/20 18:40	11/27/20 13:19	1

Client Sample ID: HPPG-ESU-TU098D-025

Lab Sample ID: 160-40199-25

Date Collected: 10/28/20 11:31

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.668		0.181	0.196		0.0630	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Actinium-227	0.172	U	0.388	0.389		0.350	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Bismuth-212	0.0328	U	0.819	0.819		0.671	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Bismuth-214	0.469		0.135	0.145		0.0483	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Cesium-137	-0.0289	U	0.0583	0.0584	0.0700	0.0592	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Lead-210	1.65		1.84	1.85		1.12	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Lead-212	0.414		0.106	0.117		0.0588	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Lead-214	0.522		0.148	0.160		0.0594	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Potassium-40	9.37		1.53	1.87		0.289	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Protactinium-231	0.152	U	1.70	1.70		2.63	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Protactinium-234	0.184	U	0.288	0.289		0.271	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Radium-226	0.469		0.135	0.145	0.200	0.0483	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Radium-228	0.668		0.181	0.196		0.0630	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Thallium-208	0.173		0.0724	0.0751		0.0311	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Thorium 228	0.414		0.106	0.117		0.0588	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Thorium-232	0.668		0.181	0.196		0.0630	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Thorium-234	-0.0656	U	1.21	1.21		0.993	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Uranium-235	-0.0640	U	0.114	0.114		0.551	pCi/g	11/04/20 18:40	11/27/20 13:24	1
Uranium-238	-0.0656	U	1.21	1.21		0.993	pCi/g	11/04/20 18:40	11/27/20 13:24	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-ESU-TU098D-B-001

Lab Sample ID: 160-40199-26

Date Collected: 10/28/20 11:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.0226	U	0.0601	0.0601	0.160	0.0477	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits							
Sr Carrier	101		40 - 110							
								Prepared	Analyzed	Dil Fac
								11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.571		0.199	0.208		0.137	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Actinium-227	0.508		0.407	0.412		0.206	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Bismuth-212	0.0472	U	0.749	0.749		0.612	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Bismuth-214	0.518		0.177	0.185		0.0717	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Cesium-137	0.0184	U	0.0614	0.0615	0.0700	0.0487	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Lead-210	-0.530	U	1.44	1.44		1.21	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Lead-212	0.373		0.114	0.124		0.0726	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Lead-214	0.381		0.145	0.150		0.0937	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Potassium-40	7.88		1.39	1.61		0.142	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Protactinium-231	0.000	U	0.345	0.345		2.35	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Protactinium-234	0.0156	U	0.0422	0.0423		0.272	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Radium-226	0.518		0.177	0.185	0.200	0.0717	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Radium-228	0.571		0.199	0.208		0.137	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Thallium-208	0.146		0.0967	0.0978		0.0391	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Thorium 228	0.373		0.114	0.124		0.0726	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Thorium-232	0.571		0.199	0.208		0.137	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Thorium-234	0.378	U	0.564	0.566		0.470	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Uranium-235	0.0991	U	0.204	0.204		0.480	pCi/g	11/04/20 18:40	11/27/20 13:34	1
Uranium-238	0.378	U	0.564	0.566		0.470	pCi/g	11/04/20 18:40	11/27/20 13:34	1

Client Sample ID: HPPG-F-023

Lab Sample ID: 160-40199-27

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.101	U	0.0536	0.0541	0.160	0.0516	pCi/g	11/25/20 14:30	12/11/20 07:05	1
Carrier	%Yield	Qualifier	Limits							
Sr Carrier	102		40 - 110							
								Prepared	Analyzed	Dil Fac
								11/25/20 14:30	12/11/20 07:05	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.354		0.191	0.195		0.0879	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Actinium-227	-0.289	U	0.638	0.639		0.409	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Bismuth-212	0.280	U	0.772	0.772		0.611	pCi/g	11/04/20 18:40	11/27/20 13:35	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Client Sample ID: HPPG-F-023

Lab Sample ID: 160-40199-27

Date Collected: 10/28/20 10:52

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.430		0.124	0.132		0.0603	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Cesium-137	-0.0269	U	0.0699	0.0700	0.0700	0.0555	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Lead-210	0.464	U	1.45	1.45		0.971	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Lead-212	0.386		0.0978	0.110		0.0562	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Lead-214	0.444		0.127	0.135		0.0563	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Potassium-40	9.04		1.37	1.65		0.290	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Protactinium-231	-0.456	U	2.79	2.79		2.28	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Protactinium-234	-0.102	U	0.324	0.324		0.264	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Radium-226	0.430		0.124	0.132	0.200	0.0603	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Radium-228	0.354		0.191	0.195		0.0879	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Thallium-208	0.212		0.0541	0.0584		0.0144	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Thorium 228	0.386		0.0978	0.110		0.0562	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Thorium-232	0.354		0.191	0.195		0.0879	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Thorium-234	-0.631	U	1.04	1.05		0.876	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Uranium-235	0.196	U	0.316	0.316		0.263	pCi/g	11/04/20 18:40	11/27/20 13:35	1
Uranium-238	-0.631	U	1.04	1.05		0.876	pCi/g	11/04/20 18:40	11/27/20 13:35	1

Client Sample ID: HPPG-F-024

Lab Sample ID: 160-40199-28

Date Collected: 10/28/20 10:49

Matrix: Solid

Date Received: 10/30/20 08:58

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium 228	0.576		0.199	0.207		0.0737	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Actinium-227	0.113	U	0.391	0.391		0.313	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Bismuth-212	-0.0928	U	0.909	0.909		0.741	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Bismuth-214	0.511		0.135	0.145		0.0464	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Cesium-137	-0.00254	U	0.0525	0.0525	0.0700	0.0481	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Lead-210	1.23		1.53	1.54		0.964	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Lead-212	0.418		0.0902	0.100		0.0462	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Lead-214	0.512		0.120	0.131		0.0470	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Potassium-40	6.67		1.30	1.46		0.212	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Protactinium-231	0.343	U	1.42	1.42		2.21	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Protactinium-234	-0.0202	U	0.0407	0.0407		0.246	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Radium-226	0.511		0.135	0.145	0.200	0.0464	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Radium-228	0.576		0.199	0.207		0.0737	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Thallium-208	0.232		0.0691	0.0730		0.0200	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Thorium 228	0.418		0.0902	0.100		0.0462	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Thorium-232	0.576		0.199	0.207		0.0737	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Thorium-234	-0.899	U	0.583	0.591		0.780	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Uranium-235	-0.0135	U	0.0204	0.0204		0.247	pCi/g	11/04/20 18:40	11/27/20 13:38	1
Uranium-238	-0.899	U	0.583	0.591		0.780	pCi/g	11/04/20 18:40	11/27/20 13:38	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-490265/23-A
Matrix: Solid
Analysis Batch: 491588

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490265

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.02016	U	0.0539	0.0539	0.160	0.0460	pCi/g	11/25/20 14:30	12/11/20 07:07	1
Carrier	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Sr Carrier	96.3		40 - 110		11/25/20 14:30	12/11/20 07:07	1			

Lab Sample ID: LCS 160-490265/1-A
Matrix: Solid
Analysis Batch: 491444

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490265

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Total Beta Strontium	7.76	6.013		0.491	0.160	0.0470	pCi/g	77	75 - 125
Carrier	LCS %Yield	LCS Qualifier	Limits						
Sr Carrier	109		40 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488230/1-A
Matrix: Solid
Analysis Batch: 490283

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488230

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-228	-0.05630	U	0.114	0.114		0.183	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Actinium-227	-0.02825	U	0.499	0.499		0.309	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Bismuth-212	-0.6151	U	0.993	0.995		0.758	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Bismuth-214	0.06275	U	0.0418	0.0423		0.171	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Cesium-137	-0.001577	U	0.0413	0.0413	0.0700	0.0337	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Lead-210	1.393		1.56	1.57		1.05	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Lead-212	0.0000	U	0.0589	0.0589		0.0976	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Lead-214	-0.05366	U	0.117	0.117		0.101	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Potassium-40	0.3398		0.304	0.306		0.158	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Protactinium-231	0.0000	U	0.220	0.220		2.38	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Protactinium-234	-0.04318	U	0.130	0.130		0.218	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Radium-226	0.06275	U	0.0418	0.0423	0.200	0.171	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Radium-228	-0.05630	U	0.114	0.114		0.183	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Thallium-208	0.02386		0.0509	0.0509		0.0211	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Thorium 228	0.0000	U	0.0589	0.0589		0.0976	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Thorium-232	-0.05630	U	0.114	0.114		0.183	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Thorium-234	0.1407	U	0.479	0.479		0.373	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Uranium-235	0.0000	U	0.0740	0.0740		0.394	pCi/g	11/04/20 18:40	11/26/20 19:06	1
Uranium-238	0.1407	U	0.479	0.479		0.373	pCi/g	11/04/20 18:40	11/26/20 19:06	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488230/2-A
Matrix: Solid
Analysis Batch: 490650

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488230

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	98.18		10.3		0.438	pCi/g	102	87 - 116	
Cesium-137	26.7	24.47		2.61	0.0700	0.101	pCi/g	91	87 - 120	
Cobalt-60	9.50	8.506		0.894		0.0252	pCi/g	89	87 - 115	

Lab Sample ID: 160-40199-28 DU
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: HPPG-F-024
Prep Type: Total/NA
Prep Batch: 488230

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium 228	0.576		0.4932		0.130		0.0354	pCi/g	0.25	1
Actinium-227	0.113	U	0.01588	U	0.0670		0.269	pCi/g	0.21	1
Bismuth-212	-0.0928	U	-0.1551	U	0.649		0.524	pCi/g	0.04	1
Bismuth-214	0.511		0.3688		0.104		0.0387	pCi/g	0.57	1
Cesium-137	-0.00254	U	0.001939	U	0.0439	0.0700	0.0360	pCi/g	0.05	1
Lead-210	1.23		0.1639	U	1.03		0.836	pCi/g	0.42	1
Lead-212	0.418		0.4793		0.0988		0.0332	pCi/g	0.31	1
Lead-214	0.512		0.3444		0.0916		0.0434	pCi/g	0.75	1
Potassium-40	6.67		7.525		1.31		0.226	pCi/g	0.31	1
Protactinium-231	0.343	U	0.3825	U	1.41		1.65	pCi/g	0.01	1
Protactinium-234	-0.0202	U	-0.03179	U	0.0908		0.197	pCi/g	0.09	1
Radium-226	0.511		0.3688		0.104	0.200	0.0387	pCi/g	0.57	1
Radium-228	0.576		0.4932		0.130		0.0354	pCi/g	0.25	1
Thallium-208	0.232		0.1905		0.0482		0.0109	pCi/g	0.34	1
Thorium 228	0.418		0.4793		0.0988		0.0332	pCi/g	0.31	1
Thorium-232	0.576		0.4932		0.130		0.0354	pCi/g	0.25	1
Thorium-234	-0.899	U	-0.3329	U	0.265		0.866	pCi/g	0.66	1
Uranium-235	-0.0135	U	0.09482	U	0.192		0.367	pCi/g	0.51	1
Uranium-238	-0.899	U	-0.3329	U	0.265		0.866	pCi/g	0.66	1

Lab Sample ID: MB 160-488430/1-A
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488430

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.1242	U	0.470	0.470		0.273	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Bismuth-212	0.3039	U	0.553	0.554		0.417	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Bismuth-214	-0.05711	U	0.141	0.141		0.123	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Cesium-137	-0.02341	U	0.0487	0.0487	0.0700	0.0374	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-210	-0.03139	U	0.832	0.832		0.682	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-212	-0.01907	U	0.0725	0.0726		0.0803	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Lead-214	-0.09519	U	0.108	0.108		0.0715	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Potassium-40	0.005577	U	0.404	0.404		0.324	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Protactinium-231	0.07444	U	0.900	0.900		1.39	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Protactinium-234	0.01098	U	0.155	0.155		0.127	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Radium-226	-0.05711	U	0.141	0.141	0.200	0.123	pCi/g	11/05/20 19:07	11/27/20 19:09	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-488430/1-A
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488430

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thallium-208	0.01737	U	0.0439	0.0439		0.0237	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium 228	-0.01907	U	0.0725	0.0726		0.0803	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium-232	0.06301		0.0743	0.0746		0.0508	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Thorium-234	0.1255	U	0.559	0.559		0.454	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Uranium-235	-0.006199	U	0.0105	0.0105		0.215	pCi/g	11/05/20 19:07	11/27/20 19:09	1
Uranium-238	0.1255	U	0.559	0.559		0.454	pCi/g	11/05/20 19:07	11/27/20 19:09	1

Lab Sample ID: LCS 160-488430/2-A
Matrix: Solid
Analysis Batch: 490333

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488430

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium-241	96.4	97.59		11.5		0.634	pCi/g	101	87 - 116
Cesium-137	26.8	29.30		3.08	0.0700	0.128	pCi/g	110	87 - 120
Cobalt-60	9.52	10.55		1.17		0.0583	pCi/g	111	87 - 115

Lab Sample ID: 160-40199-8 DU
Matrix: Solid
Analysis Batch: 490335

Client Sample ID: HPPG-ESU-TU098D-008
Prep Type: Total/NA
Prep Batch: 488430

Analyte	Sample Sample		DU DU		Total	LOQ	DLC	Unit	RER	RER
	Result	Qual	Result	Qual	Uncert. (2σ+/-)					Limit
Actinium 228	0.142	U	0.6143		0.173		0.0389	pCi/g	1.15	1
Actinium-227	0.124	U	0.2185	U	0.429		0.245	pCi/g	0.11	1
Bismuth-212	0.439	U	0.0000	U	0.512		0.501	pCi/g	0.33	1
Bismuth-214	0.462		0.3643		0.117		0.0454	pCi/g	0.37	1
Cesium-137	-0.00161	U	0.004350	U	0.0411	0.0700	0.0334	pCi/g	0.06	1
Lead-210	-1.74	U	0.2284	U	1.02		0.826	pCi/g	0.80	1
Lead-212	0.347		0.4648		0.102		0.0385	pCi/g	0.57	1
Lead-214	0.442		0.4276		0.0983		0.0411	pCi/g	0.06	1
Potassium-40	9.02		8.015		1.41		0.248	pCi/g	0.33	1
Protactinium-231	0.351	U	-0.7193	U	2.35		1.91	pCi/g	0.28	1
Protactinium-234	0.0634	U	0.005267	U	0.00980		0.196	pCi/g	0.25	1
Radium-226	0.462		0.3643		0.117	0.200	0.0454	pCi/g	0.37	1
Radium-228	0.142	U	0.6143		0.173		0.0389	pCi/g	1.15	1
Thallium-208	0.121		0.1466		0.0462		0.0144	pCi/g	0.21	1
Thorium 228	0.347		0.4648		0.102		0.0385	pCi/g	0.57	1
Thorium-232	0.142	U	0.6143		0.173		0.0389	pCi/g	1.15	1
Thorium-234	-0.321	U	-0.3628	U	0.264		0.976	pCi/g	0.04	1
Uranium-235	-0.156	U	0.0000	U	0.188		0.343	pCi/g	0.23	1
Uranium-238	-0.321	U	-0.3628	U	0.264		0.976	pCi/g	0.04	1

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Rad

Leach Batch: 487644

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-1	HPPG-ESU-TU098D-001	Total/NA	Solid	Dry and Grind	
160-40199-2	HPPG-ESU-TU098D-002	Total/NA	Solid	Dry and Grind	
160-40199-3	HPPG-ESU-TU098D-003	Total/NA	Solid	Dry and Grind	
160-40199-4	HPPG-ESU-TU098D-004	Total/NA	Solid	Dry and Grind	
160-40199-5	HPPG-ESU-TU098D-005	Total/NA	Solid	Dry and Grind	
160-40199-6	HPPG-ESU-TU098D-006	Total/NA	Solid	Dry and Grind	
160-40199-7	HPPG-ESU-TU098D-007	Total/NA	Solid	Dry and Grind	
160-40199-8	HPPG-ESU-TU098D-008	Total/NA	Solid	Dry and Grind	
160-40199-9	HPPG-ESU-TU098D-009	Total/NA	Solid	Dry and Grind	
160-40199-10	HPPG-ESU-TU098D-010	Total/NA	Solid	Dry and Grind	
160-40199-11	HPPG-ESU-TU098D-011	Total/NA	Solid	Dry and Grind	
160-40199-12	HPPG-ESU-TU098D-012	Total/NA	Solid	Dry and Grind	
160-40199-13	HPPG-ESU-TU098D-013	Total/NA	Solid	Dry and Grind	
160-40199-14	HPPG-ESU-TU098D-014	Total/NA	Solid	Dry and Grind	
160-40199-15	HPPG-ESU-TU098D-015	Total/NA	Solid	Dry and Grind	
160-40199-16	HPPG-ESU-TU098D-016	Total/NA	Solid	Dry and Grind	
160-40199-17	HPPG-ESU-TU098D-017	Total/NA	Solid	Dry and Grind	
160-40199-18	HPPG-ESU-TU098D-018	Total/NA	Solid	Dry and Grind	
160-40199-19	HPPG-ESU-TU098D-019	Total/NA	Solid	Dry and Grind	
160-40199-20	HPPG-ESU-TU098D-020	Total/NA	Solid	Dry and Grind	
160-40199-8 DU	HPPG-ESU-TU098D-008	Total/NA	Solid	Dry and Grind	

Leach Batch: 487645

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-21	HPPG-ESU-TU098D-021	Total/NA	Solid	Dry and Grind	
160-40199-22	HPPG-ESU-TU098D-022	Total/NA	Solid	Dry and Grind	
160-40199-23	HPPG-ESU-TU098D-023	Total/NA	Solid	Dry and Grind	
160-40199-24	HPPG-ESU-TU098D-024	Total/NA	Solid	Dry and Grind	
160-40199-25	HPPG-ESU-TU098D-025	Total/NA	Solid	Dry and Grind	
160-40199-26	HPPG-ESU-TU098D-B-001	Total/NA	Solid	Dry and Grind	
160-40199-27	HPPG-F-023	Total/NA	Solid	Dry and Grind	
160-40199-28	HPPG-F-024	Total/NA	Solid	Dry and Grind	
160-40199-28 DU	HPPG-F-024	Total/NA	Solid	Dry and Grind	

Prep Batch: 488230

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-9	HPPG-ESU-TU098D-009	Total/NA	Solid	Fill_Geo-21	487644
160-40199-10	HPPG-ESU-TU098D-010	Total/NA	Solid	Fill_Geo-21	487644
160-40199-11	HPPG-ESU-TU098D-011	Total/NA	Solid	Fill_Geo-21	487644
160-40199-12	HPPG-ESU-TU098D-012	Total/NA	Solid	Fill_Geo-21	487644
160-40199-13	HPPG-ESU-TU098D-013	Total/NA	Solid	Fill_Geo-21	487644
160-40199-14	HPPG-ESU-TU098D-014	Total/NA	Solid	Fill_Geo-21	487644
160-40199-15	HPPG-ESU-TU098D-015	Total/NA	Solid	Fill_Geo-21	487644
160-40199-16	HPPG-ESU-TU098D-016	Total/NA	Solid	Fill_Geo-21	487644
160-40199-17	HPPG-ESU-TU098D-017	Total/NA	Solid	Fill_Geo-21	487644
160-40199-18	HPPG-ESU-TU098D-018	Total/NA	Solid	Fill_Geo-21	487644
160-40199-19	HPPG-ESU-TU098D-019	Total/NA	Solid	Fill_Geo-21	487644
160-40199-20	HPPG-ESU-TU098D-020	Total/NA	Solid	Fill_Geo-21	487644
160-40199-21	HPPG-ESU-TU098D-021	Total/NA	Solid	Fill_Geo-21	487645
160-40199-22	HPPG-ESU-TU098D-022	Total/NA	Solid	Fill_Geo-21	487645
160-40199-23	HPPG-ESU-TU098D-023	Total/NA	Solid	Fill_Geo-21	487645

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Rad (Continued)

Prep Batch: 488230 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-24	HPPG-ESU-TU098D-024	Total/NA	Solid	Fill_Geo-21	487645
160-40199-25	HPPG-ESU-TU098D-025	Total/NA	Solid	Fill_Geo-21	487645
160-40199-26	HPPG-ESU-TU098D-B-001	Total/NA	Solid	Fill_Geo-21	487645
160-40199-27	HPPG-F-023	Total/NA	Solid	Fill_Geo-21	487645
160-40199-28	HPPG-F-024	Total/NA	Solid	Fill_Geo-21	487645
MB 160-488230/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488230/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40199-28 DU	HPPG-F-024	Total/NA	Solid	Fill_Geo-21	487645

Prep Batch: 488430

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-1	HPPG-ESU-TU098D-001	Total/NA	Solid	Fill_Geo-21	487644
160-40199-2	HPPG-ESU-TU098D-002	Total/NA	Solid	Fill_Geo-21	487644
160-40199-3	HPPG-ESU-TU098D-003	Total/NA	Solid	Fill_Geo-21	487644
160-40199-4	HPPG-ESU-TU098D-004	Total/NA	Solid	Fill_Geo-21	487644
160-40199-5	HPPG-ESU-TU098D-005	Total/NA	Solid	Fill_Geo-21	487644
160-40199-6	HPPG-ESU-TU098D-006	Total/NA	Solid	Fill_Geo-21	487644
160-40199-7	HPPG-ESU-TU098D-007	Total/NA	Solid	Fill_Geo-21	487644
160-40199-8	HPPG-ESU-TU098D-008	Total/NA	Solid	Fill_Geo-21	487644
MB 160-488430/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488430/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40199-8 DU	HPPG-ESU-TU098D-008	Total/NA	Solid	Fill_Geo-21	487644

Prep Batch: 490265

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40199-1	HPPG-ESU-TU098D-001	Total/NA	Solid	DPS-0	487644
160-40199-11	HPPG-ESU-TU098D-011	Total/NA	Solid	DPS-0	487644
160-40199-21	HPPG-ESU-TU098D-021	Total/NA	Solid	DPS-0	487645
160-40199-26	HPPG-ESU-TU098D-B-001	Total/NA	Solid	DPS-0	487645
160-40199-27	HPPG-F-023	Total/NA	Solid	DPS-0	487645
MB 160-490265/23-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-490265/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Page 65 of 65

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40199-1

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

Percent Yield (Acceptance Limits)

Lab Sample ID	Client Sample ID	Sr (40-110)
160-40199-1	HPPG-ESU-TU098D-001	103
160-40199-11	HPPG-ESU-TU098D-011	102
160-40199-21	HPPG-ESU-TU098D-021	101
160-40199-26	HPPG-ESU-TU098D-B-001	101
160-40199-27	HPPG-F-023	102
LCS 160-490265/1-A	Lab Control Sample	109
MB 160-490265/23-A	Method Blank	96.3

Tracer/Carrier Legend

Sr = Sr Carrier

Hunters Point Naval Shipyard, Parcel G, RSY Data Report

Contract No. N62473-17-D-006 CTO N6247318F5065 RSY Pad Data Report	
RSY Pad: RSY 29 Use 1	Soil Origin: Former Building Sites 317, 364, and 365 SU28A
Data attached and submitted by: Amy Mangel	Data Report Submittal Date: 01/05/2021

Systematic Soil Sample Data: RSY 29 Use 1									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-317364365-SU28A-001	1	Systematic	11,440	15,658	0.336	-0.000467	0.0443	0.0270	0.000
HPPG-317364365-SU28A-002	2	Systematic	10,207	15,658	0.439	-0.0459	N/A	N/A	N/A
HPPG-317364365-SU28A-003	3	Systematic	11,124	15,658	0.179	0.0244	N/A	N/A	N/A
HPPG-317364365-SU28A-004	4	Systematic	11,376	15,658	0.380	0.00474	N/A	N/A	N/A
HPPG-317364365-SU28A-005	5	Systematic	10,130	15,658	0.357	-0.0284	N/A	N/A	N/A
HPPG-317364365-SU28A-006	6	Systematic	10,163	15,658	0.373	0.0306	N/A	N/A	N/A
HPPG-317364365-SU28A-007	7	Systematic	11,478	15,658	0.666	0.0361	N/A	N/A	N/A
HPPG-317364365-SU28A-008	8	Systematic	10,578	15,658	0.0994	0.0189	N/A	N/A	N/A
HPPG-317364365-SU28A-009	9	Systematic	10,651	15,658	0.202	-0.0958	N/A	N/A	N/A
HPPG-317364365-SU28A-010	10	Systematic	10,169	15,658	0.292	-0.00897	N/A	N/A	N/A
HPPG-317364365-SU28A-011	11	Systematic	10,574	15,658	0.276	0.000	-0.0184	0.0110	0.000
HPPG-317364365-SU28A-012	12	Systematic	10,753	15,658	0.235	0.00289	N/A	N/A	N/A
HPPG-317364365-SU28A-013	13	Systematic	8,774	15,658	0.274	0.0207	N/A	N/A	N/A
HPPG-317364365-SU28A-014	14	Systematic	9,237	15,658	0.390	-0.0442	N/A	N/A	N/A
HPPG-317364365-SU28A-015	15	Systematic	9,912	15,658	0.0648	0.0219	N/A	N/A	N/A
HPPG-317364365-SU28A-016	16	Systematic	10,950	15,658	0.132	-0.0909	N/A	N/A	N/A
HPPG-317364365-SU28A-017	17	Systematic	11,310	15,658	0.429	0.00115	N/A	N/A	N/A
HPPG-317364365-SU28A-018	18	Systematic	9,976	15,658	0.412	-0.0318	N/A	N/A	N/A
HPPG-317364365-SU28A-019	19	Systematic	10,018	15,658	0.306	0.0244	N/A	N/A	N/A
HPPG-317364365-SU28A-020	20	Systematic	9,635	15,658	0.302	-0.0548	N/A	N/A	N/A
HPPG-317364365-SU28A-021	21	Systematic	10,591	15,658	0.342	0.0273	0.00871	0.0109	0.00209
HPPG-317364365-SU28A-022	22	Systematic	10,950	15,658	0.382	0.0247	N/A	N/A	N/A
HPPG-317364365-SU28A-023	23	Systematic	9,025	15,658	0.221	0.00513	N/A	N/A	N/A
HPPG-317364365-SU28A-024	24	Systematic	9,970	15,658	0.317	0.0168	N/A	N/A	N/A
HPPG-317364365-SU28A-025	25	Systematic	10,572	15,658	0.400	0.0000949	N/A	N/A	N/A
Soil Systematic Sample Statistics					²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Maximum					0.666	0.0361	0.0443	0.0270	0.00209
Mean					0.3122	-0.0057	0.0115	0.0163	0.000697
Median					0.317	0.0029	0.0087	0.0110	0.000
Minimum					0.0648	-0.0958	-0.0184	0.0109	0.000
Standard Deviation					0.1261	0.0365	N/A	N/A	N/A

Biased Soil Sample Data: RSY 29 Use 1									
Sample Identification	Sample Location	Type of Sample	Gamma Static 3x3 NaI Reading (CPM)	Gamma 3x3 Static Investigation Level (CPM)	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Beta Sr Final Analytical Results (pCi/g)	²³⁵ U Final Analytical Results (pCi/g)	²³⁹ Pu Final Analytical Results (pCi/g)
Project Remediation Goals*					1.861	0.141	0.331	0.195	2.59
HPPG-317364365-SU28A-B-001	1	Biased	11,109	15,658	0.553	-0.0337	0.0477	0.0314	0.00576

CPM Counts per minute

pCi/g Picocuries per gram

* Note: Project Remediation goal (RG) is the Record of Decision RG or Offsite RBA value, whichever is higher

Instrument and Survey Summary					
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #
Gamma Walkover Survey	HPRS-10202020-PG-ROV-203	10/20/2020	RS-700	03/31/2022	5447/5448
Follow-Up Static Survey	HPRS-10212020-PG-JSS-210	10/21/2020	RS-700	03/31/2022	5447/5448
Systematic Sample Survey	HPRS-10212020-PG-JSS-209	10/21/2020	3x3	08/06/2021	108853
Biased Sample Survey	HPRS-10222020-PG-JSS-215	10/22/2020	3x3	08/06/2021	108853

Region of Interest (ROI) Summary	
ROI	Nuclide and Energy
ROI 3	Ra-226 (1764 keV)
ROI 6	Ra-226 (609 keV)
ROI 7	Cs-137 (662 keV)
ROI 8	Ra-226 (351 keV)
ROI 10	Gross Gamma

Summary: RSY 29 Use 1
<p>1) Gamma walkover survey and data review—upon review of initial RS-700 scan data in accordance with Final Parcel G Work Plan Section 3.5.1.1, 44 follow-up static investigations were required. Gamma scan data summary statistics, normal Q-Q plots, histograms, and box plots are provided on pages 3-6. Contour maps of the scan data for the ROIs of interest are presented on page 7. The RSY scan data was lower than the background scan data. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>2) One-minute static follow-up measurements with the RS-700 were collected at 44 gamma walkover investigation locations in accordance with Final Parcel G Work Plan Section 3.3.1. A map of the follow-up locations is presented on page 9. The net follow-up static spectra are presented on pages 14-57. The exact same RS-700 and detectors were used for the background data collection and the RSY pad data collection.</p>
<p>3) In accordance with Final Parcel G Work Plan Section 3.4.1, twenty-five systematic soil samples (001-025) were obtained and submitted for gamma spectroscopy analysis. Sample locations are shown on the Systematic Sample Survey map (page 10). TestAmerica sample results are attached (pages 58-97). Ten percent of the systematic soil samples (three samples in total -001, -011, & -021) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 58-97). Samples HPPG-F-015 and HPPG-F-016 are field duplicates, correlating to systematic samples -008 and -018. The Data Quality Assessment which will be included in the RACR will provide an analysis and discussion of field duplicates for the project. The Instrument and Survey Summary table above lists the 3x3 NaI detector used for the gamma static measurements collected during sampling activities, and the instrument-specific gamma static IL listed in the sample tables on page one is developed from that instrument's RBA data.</p> <p>Systematic sample histograms, box plots, Q-Q plots, and power curves are provided on pages 12-13. All sample results were below the applicable RGs. The number of samples collected was sufficient to meet project DQOs.</p>
<p>4) In accordance with Final Parcel G Work Plan Section 3.3.1 and 3.4.1, one biased sample was collected since all follow-up static measurements were below the ROC-specific critical levels. The biased sample was collected from the location of the highest gross gamma scan measurement. TestAmerica sample results are attached (pages 98-114). A map of the biased sample location is presented on page 11. Biased sample results were all below the applicable RGs.</p>
<p>Conclusions:</p> <p>In accordance with the DQOs in Section 3.1 of the Final Parcel G Work Plan, final analytical results for all samples from the RSY pad were shown by a point by point comparison to meet the RGs. Graphical comparisons demonstrated that ROC concentrations were consistent with background.</p> <p>RSY 29 Use 1 contains soil from Hunters Point Naval Shipyard Parcel G Phase 1 excavation Former Building Sites 317, 364, 365 SU 28A.</p> <p>APTIM requests RASO concurrence to release this soil as Non-LLRW.</p> <p>Disposition: This soil shall be used as backfill for Former Building Sites 317, 364, 365 SU 28A.</p>

Soil Scan Statistics

Statistical Summary

Dataset	PG-RSY-29-U1				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	29.06	12.03	12.02	3.71
ROI-06	47.10	125.25	85.89	85.20	12.07
ROI-07	31.06	104.22	66.89	67.12	9.99
ROI-08	63.14	156.39	107.92	108.22	14.09
ROI-10	1,783.69	2,650.48	2,241.87	2,269.81	174.95

Statistical Summary Reference Background

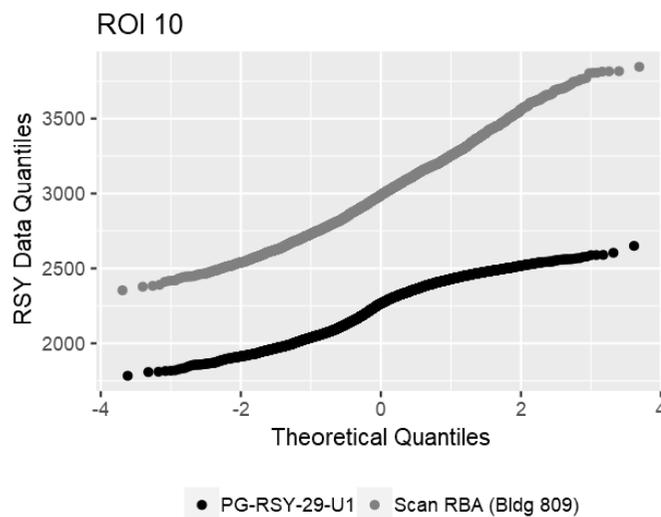
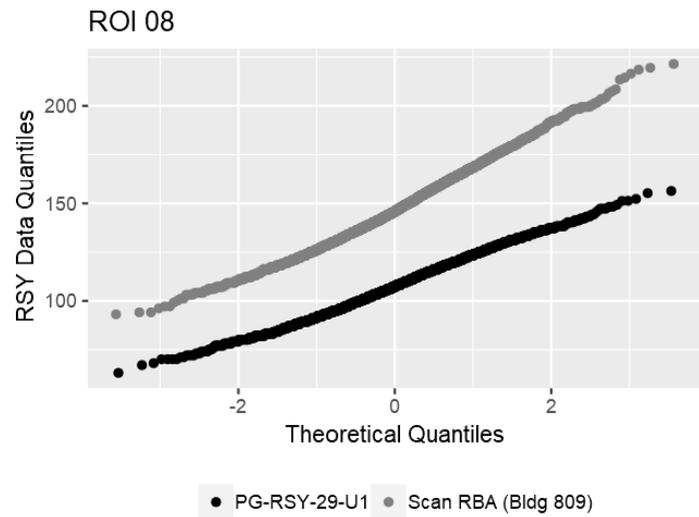
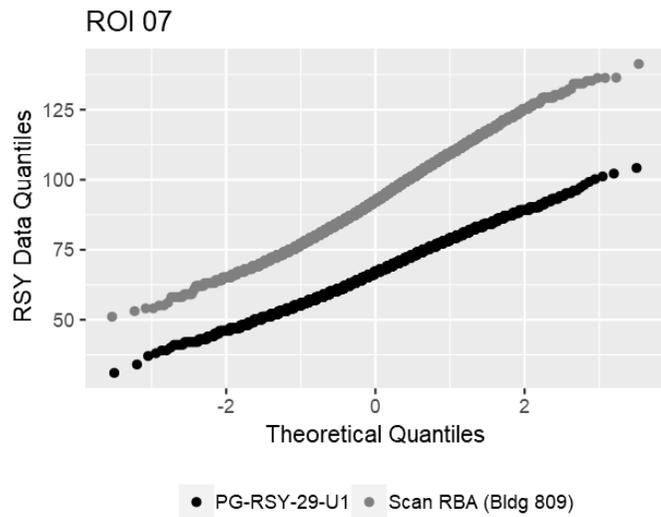
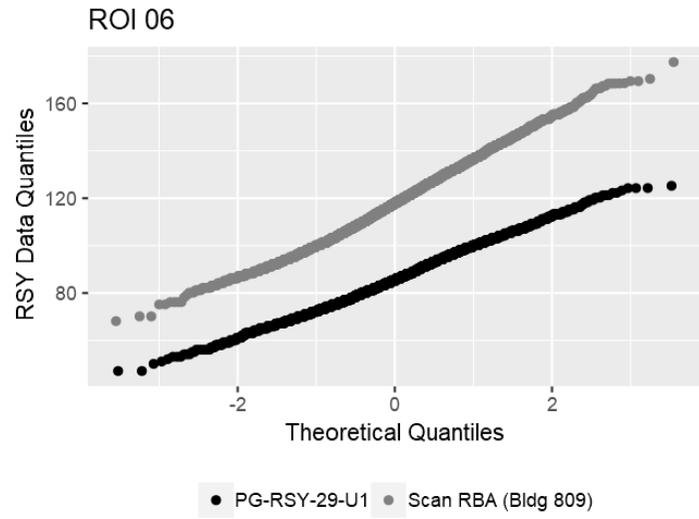
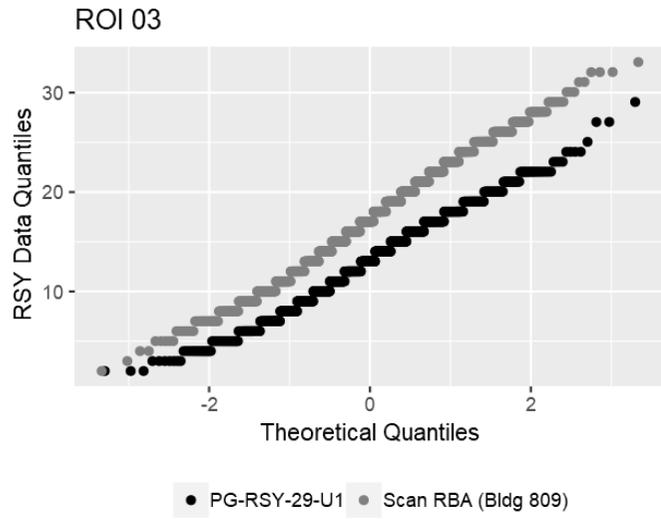
TYPE	Scan RBA (Bldg 809)				
ROI	Minimum (cps)	Maximum (cps)	Mean (cps)	Median (cps)	Standard Deviation (cps)
ROI-03	2.00	33.08	16.21	16.04	4.13
ROI-06	68.15	177.45	117.58	117.26	15.50
ROI-07	51.11	141.33	92.34	91.24	13.43
ROI-08	93.19	221.48	146.24	145.30	18.21
ROI-10	2,354.11	3,845.31	2,995.57	2,989.64	255.66

cps = counts per second

Dataset	Number of Data Points
PG-RSY-29-U1	3474
Scan RBA (Bldg 809)	4632

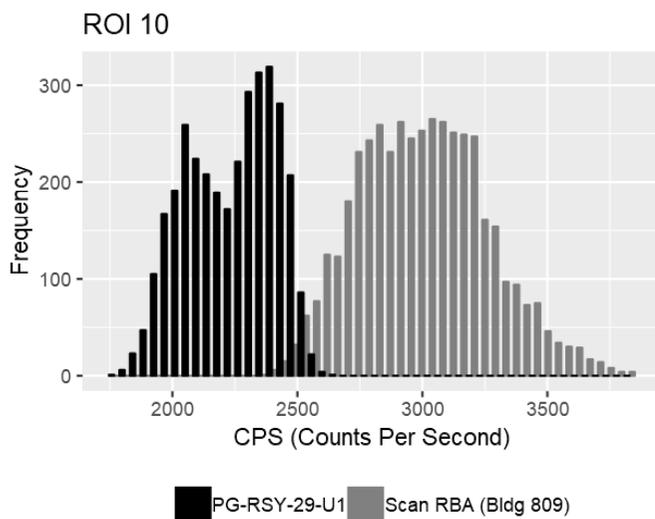
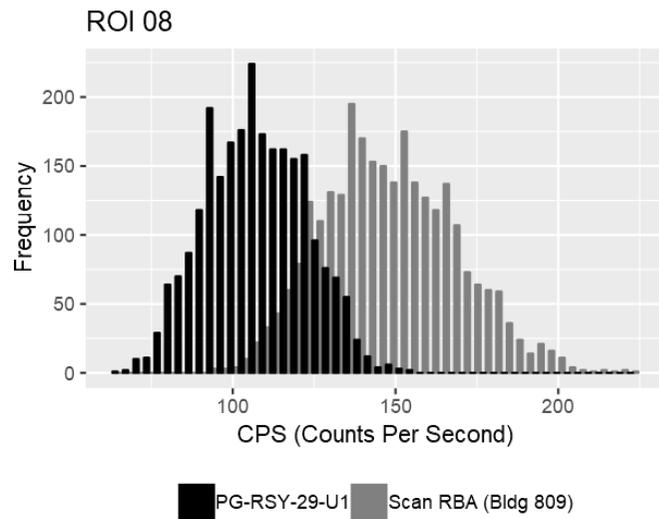
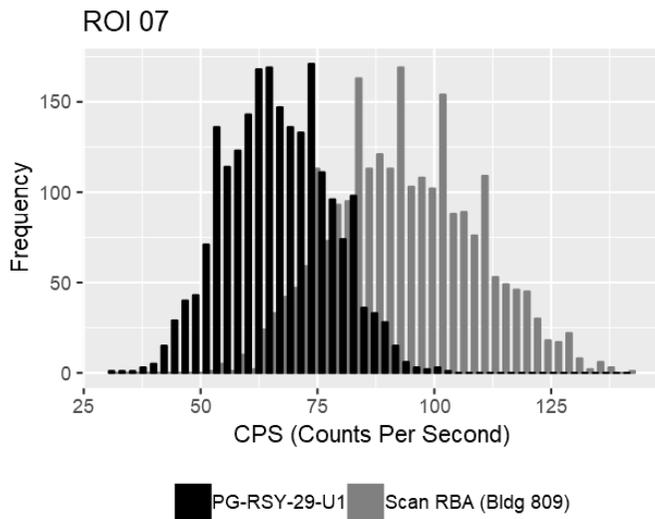
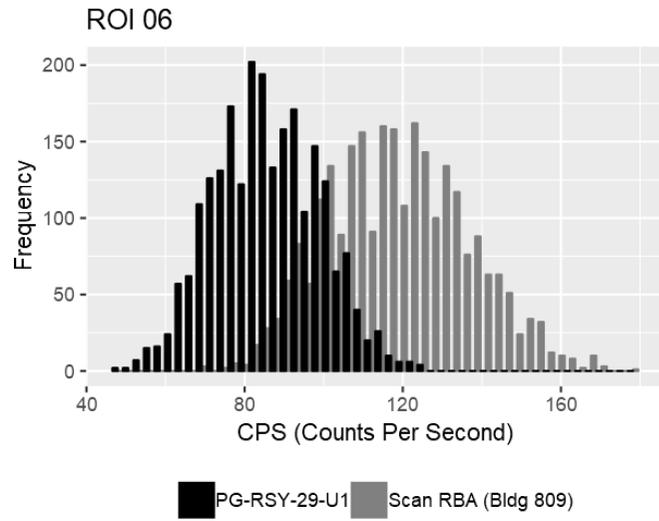
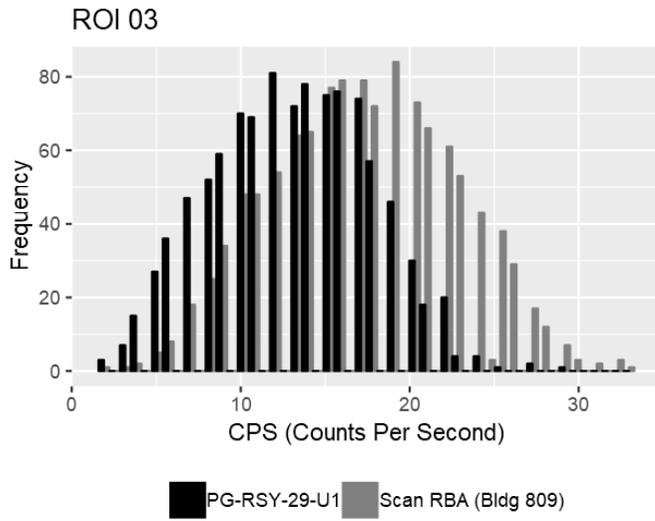
Soil Scan Statistics

Normal Q-Q Plots



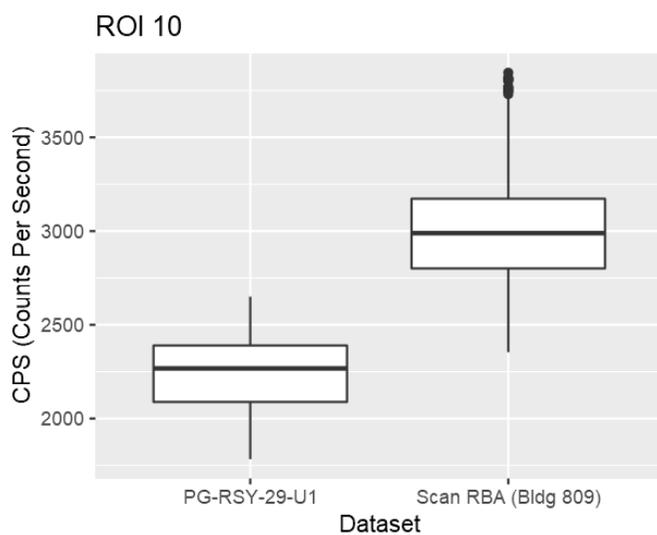
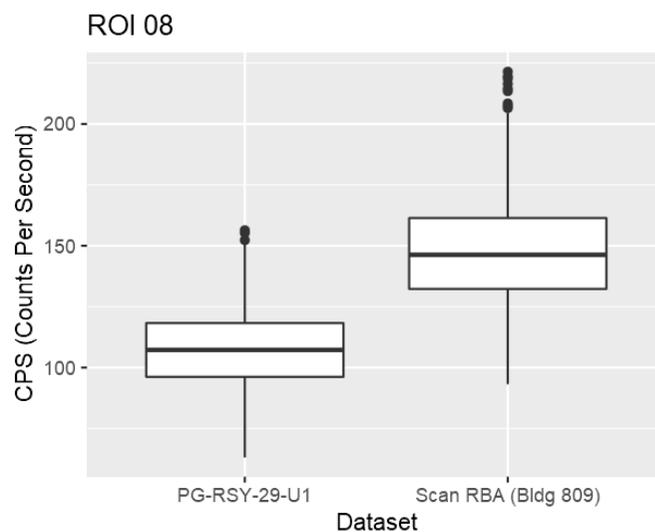
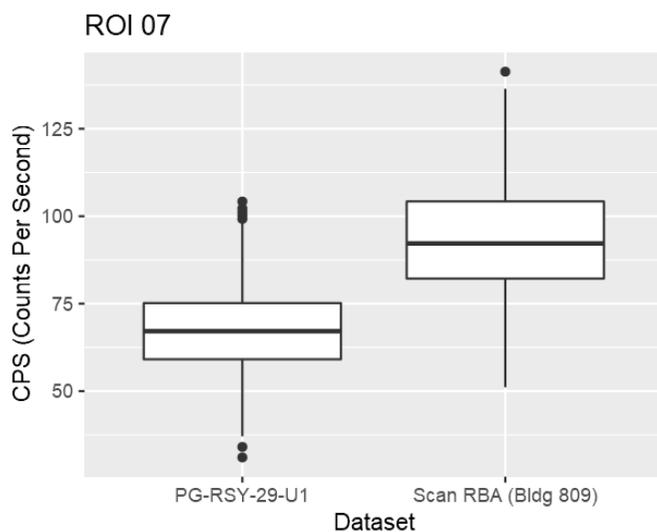
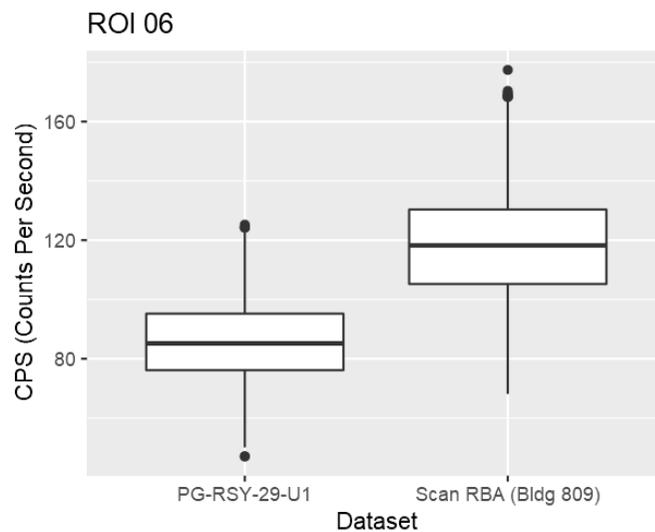
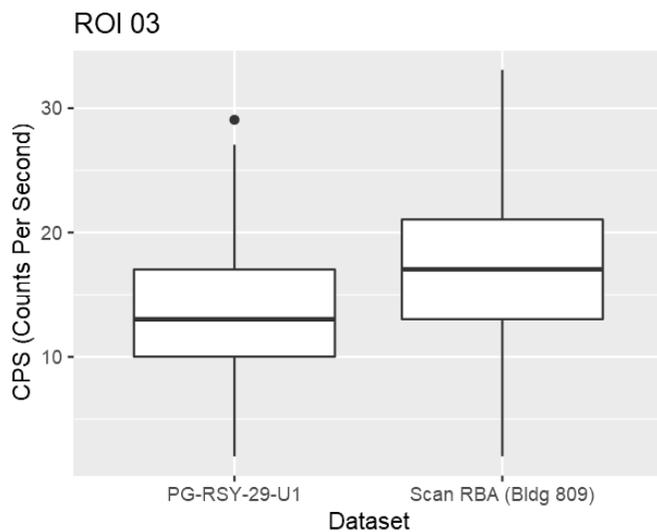
Soil Scan Statistics

Histograms



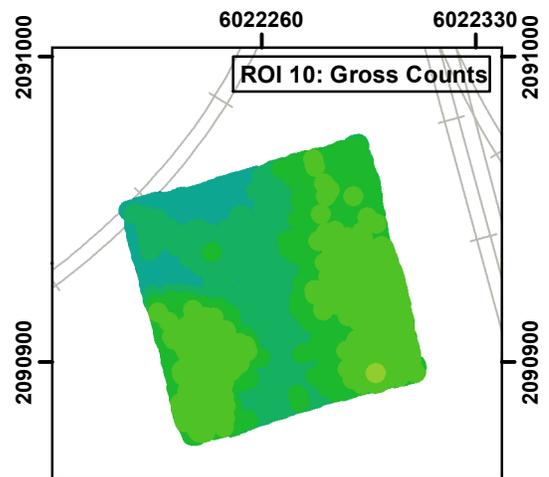
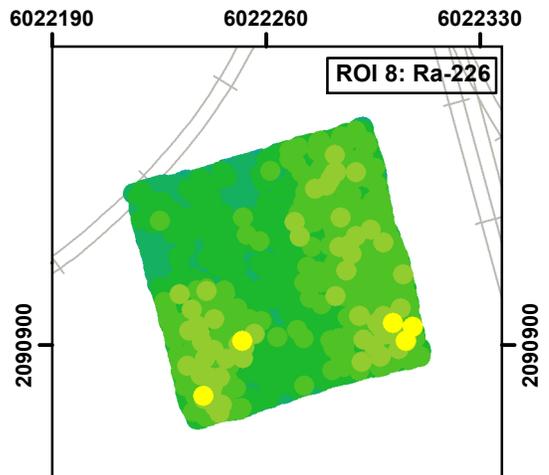
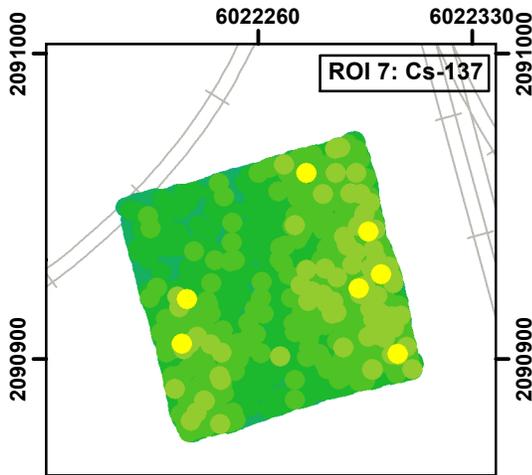
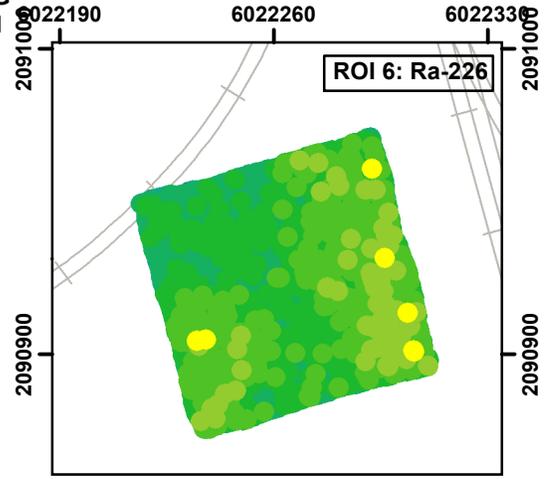
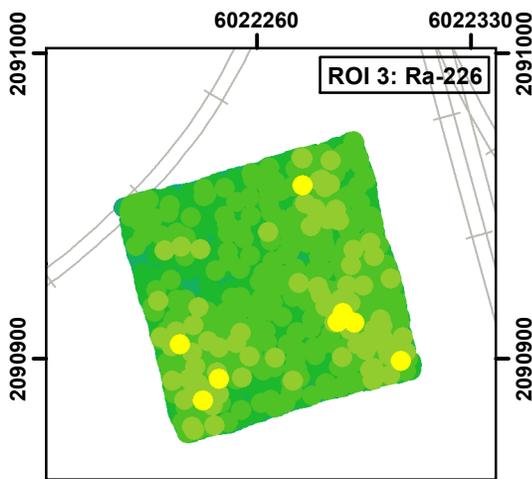
Soil Scan Statistics

Box Plots



RSI Data Plots
HPNS Parcel G
RSY 29 Use 1

SU-28A



RS 700 Gamma Walkover Survey Data (VD1)

- | | |
|--|--|
| ● > 3 std dev | ● > -1 to < 0 std dev |
| ● > 2 to < 3 std dev | ● > -2 to < -1 std dev |
| ● > 1 to < 2 std dev | ● > -3 to < -2 std dev |
| ● > 0 to < 1 std dev | ● < -3 std dev |

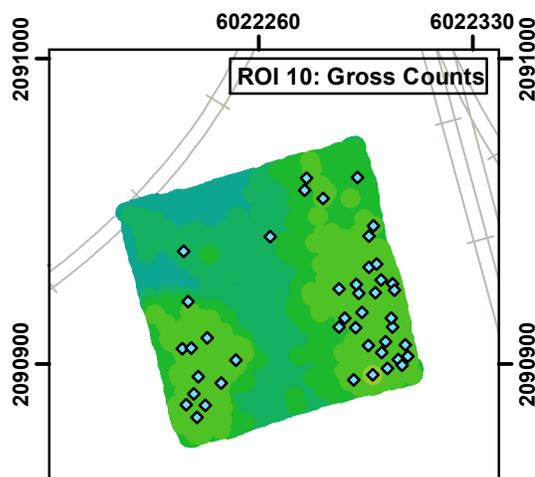
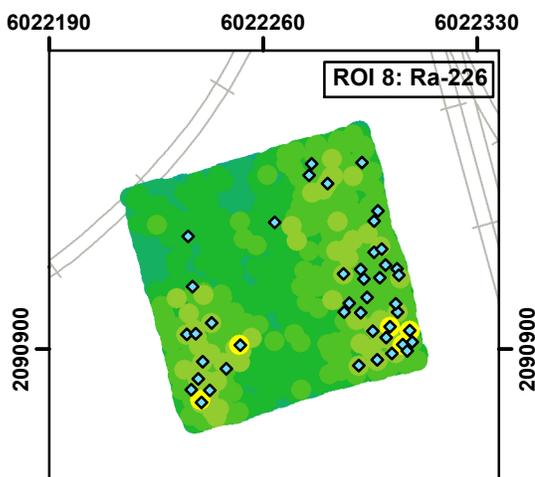
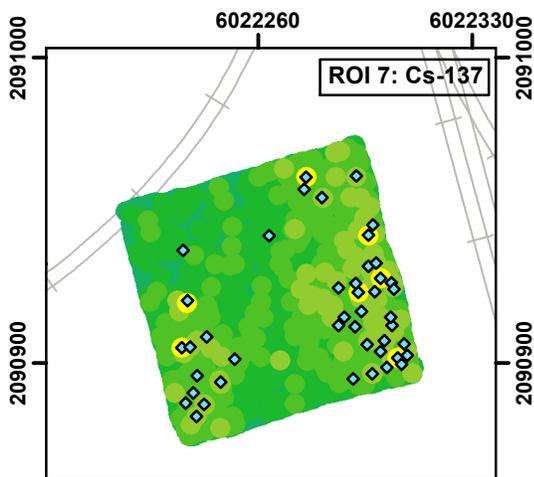
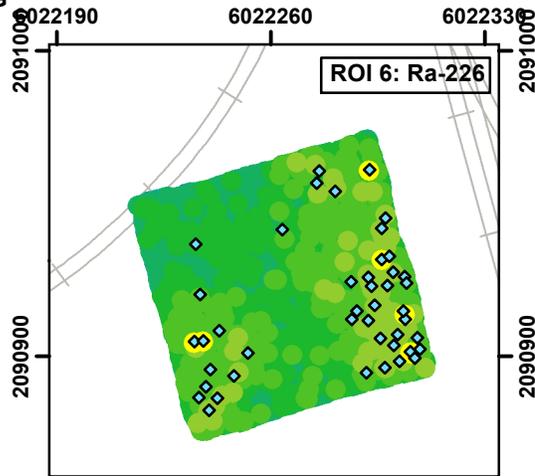
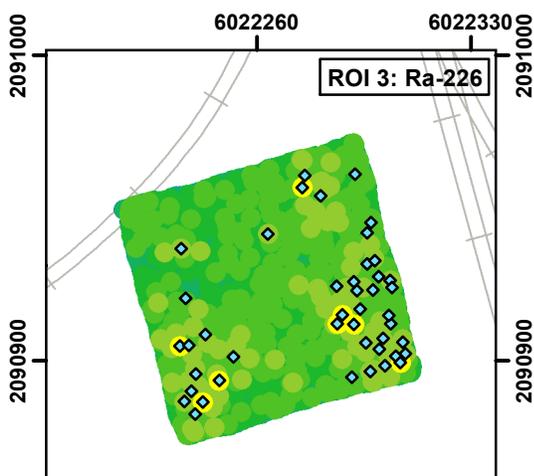


Coordinate system: CSP Zone III, NAD83, US Survey Foot



RSI Data Plots
HPNS Parcel G
RSY 29 Use 1

SU-28A



RS 700 Gamma Walkover Survey Data (VD1)

- ◆ Follow-Up Location
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev

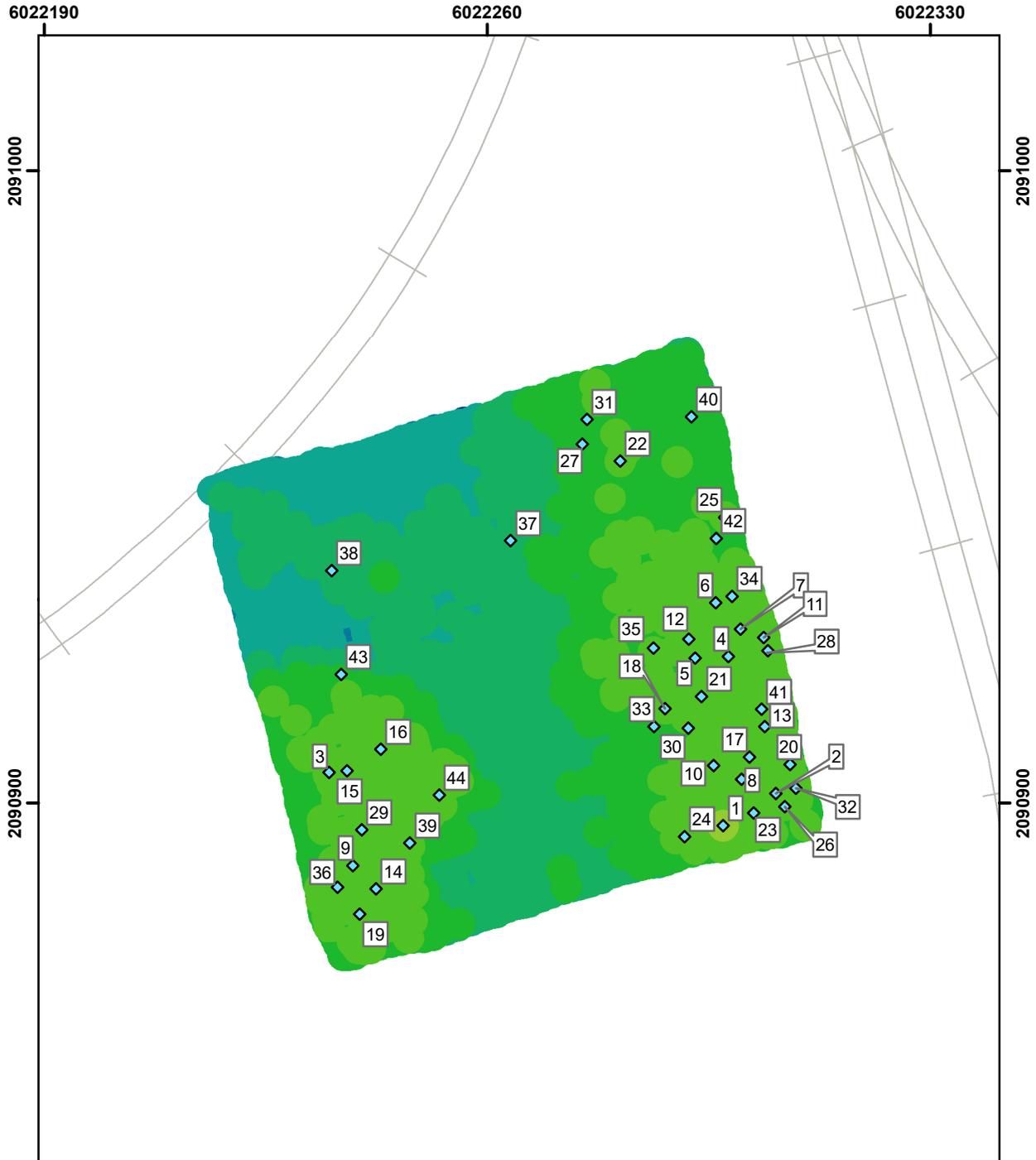


Coordinate system: CSP Zone III, NAD83, US Survey Foot



Follow-Up Static Survey
 HPNS Parcel G
 RSY 29 Use 1

SU-28A



RSY 29 Use 1 (VD1, ROI 10 Gross Gamma)

◆ Follow-Up Location	● > 1 to < 2 std dev	● > -2 to < -1 std dev
● > 3 std dev	● > 0 to < 1 std dev	● > -3 to < -2 std dev
● > 2 to < 3 std dev	● > -1 to < 0 std dev	● < -3 std dev

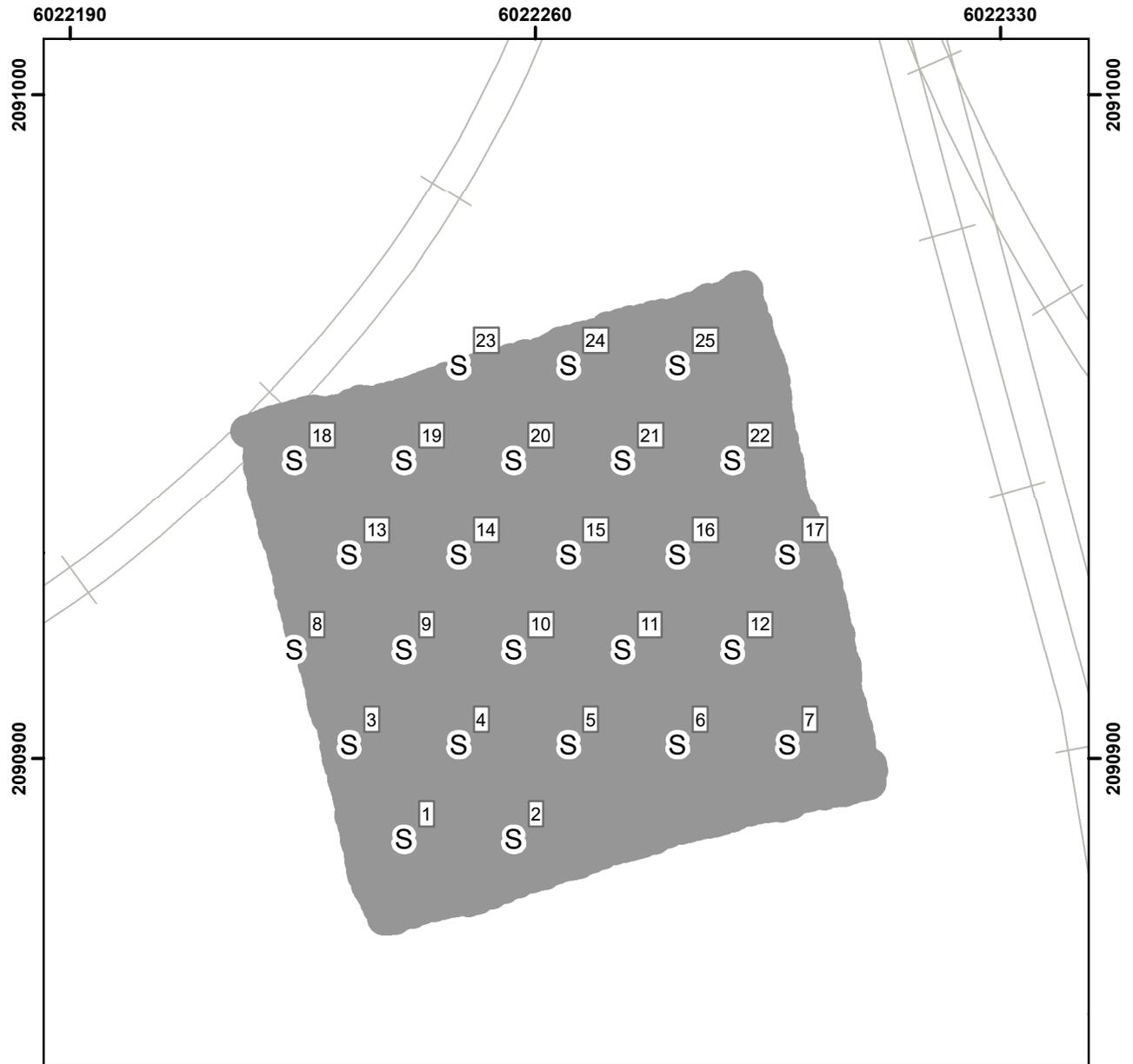
25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

The block contains a scale bar from 0 to 25 feet, the coordinate system information, a north arrow, and the APTIM logo.

**Systematic Sampling
HPNS Parcel G
RSY 29 Use 1**

SU-28A



RSY 29 Use 1

- S** Systematic Sample Locations
- RS-700 GWS Coverage

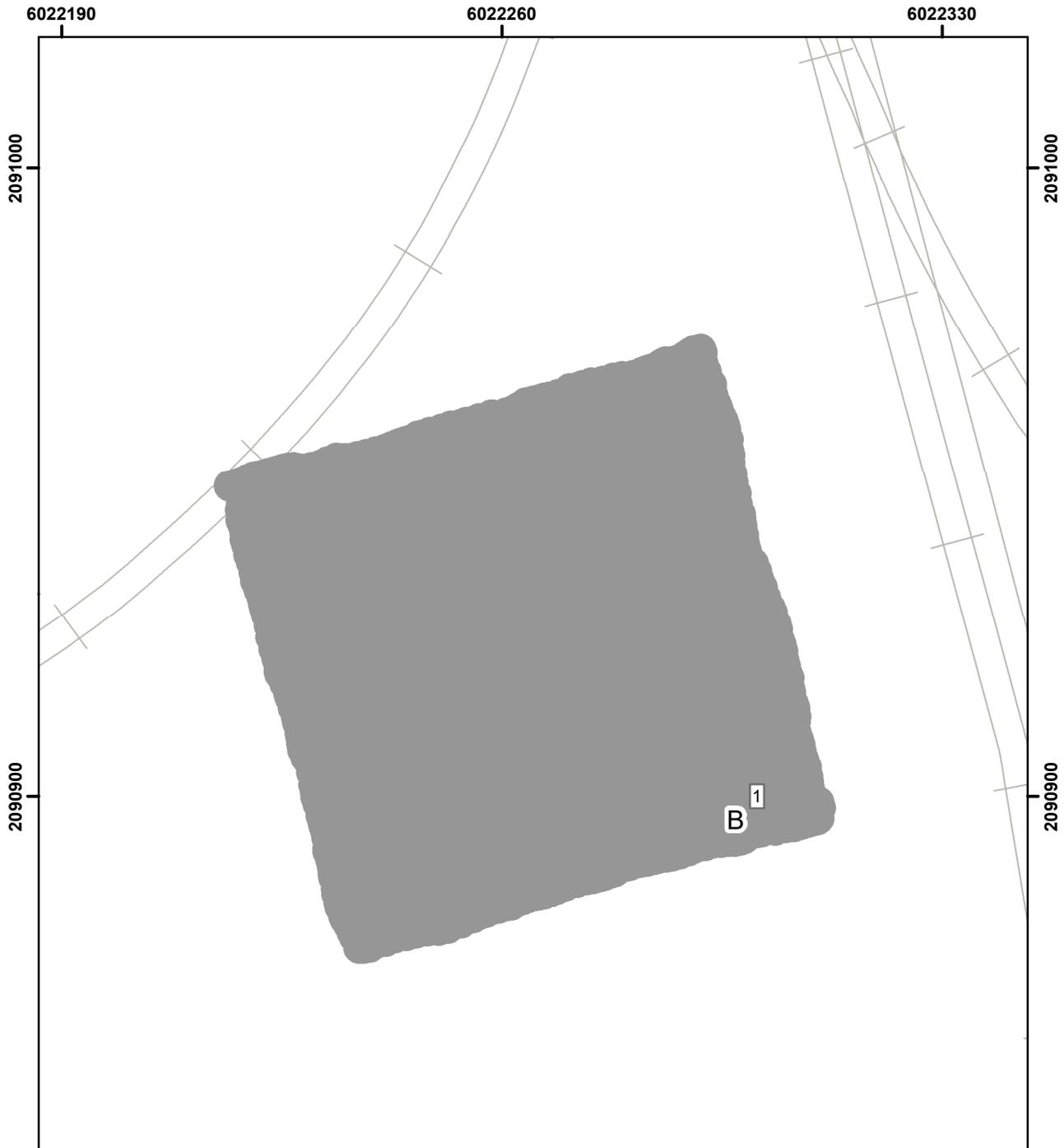
0 10 20 40 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot

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Biased Sampling
HPNS Parcel G
RSY 29 Use 1

SU-28A



RSY 29 Use 1

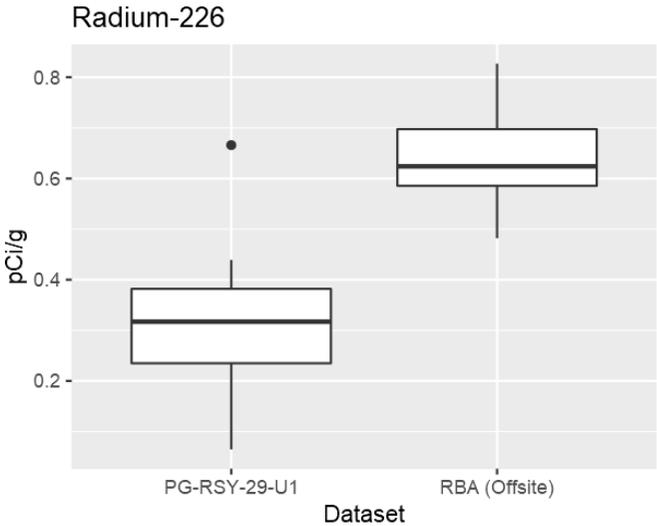
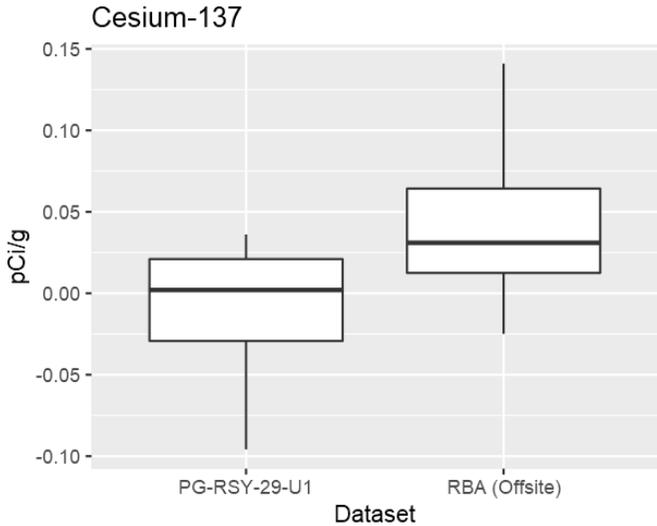
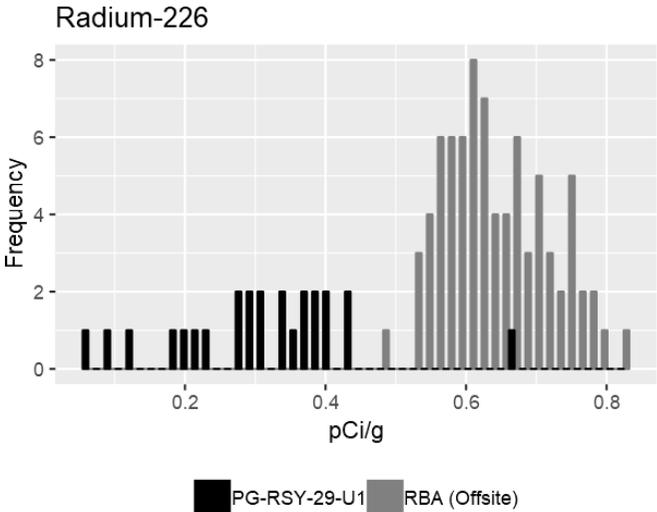
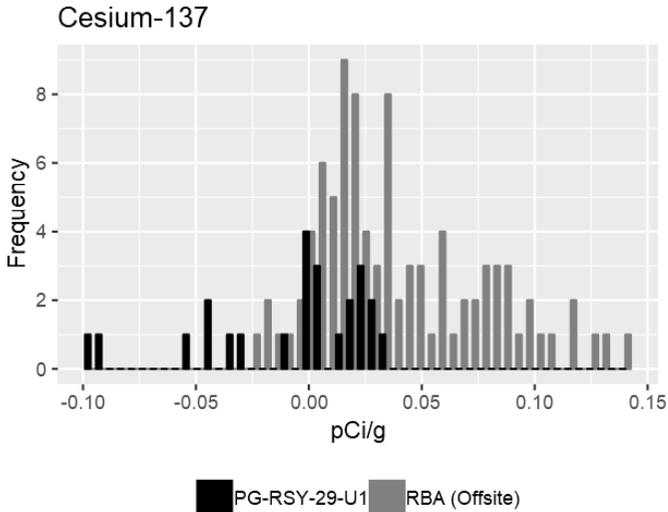
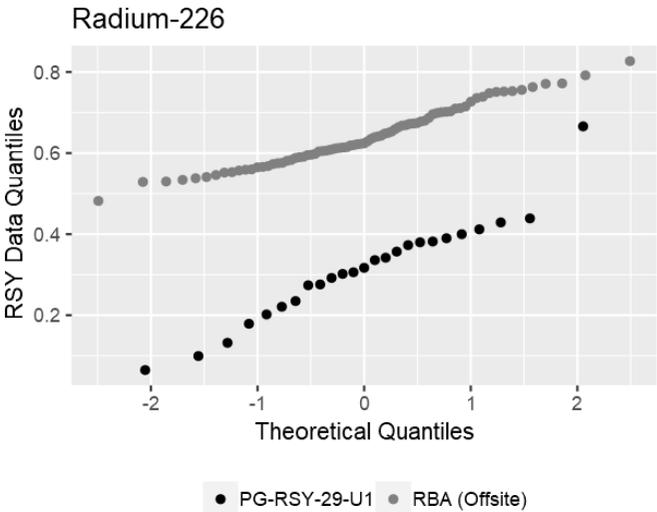
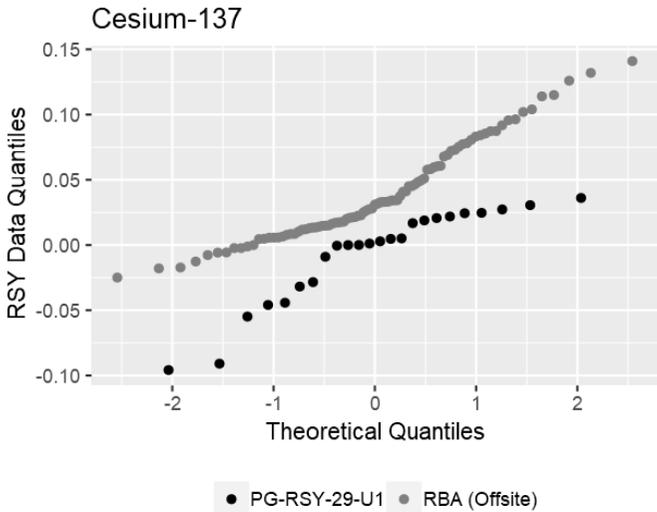
- B** Biased Sample Location
- RS-700 GWS Coverage

25 12.5 0 25 Feet

Coordinate system: CSP Zone III, NAD83, US Survey Foot



Soil Sample Statistics



WILCOXON RANK SUM TEST

Nuclide: Rn-226
LGR: 0.317 pCi/a

Location: RSY 29 Use 1

DOGL: 1
LGR = Median SU Data
LGR = 0.317

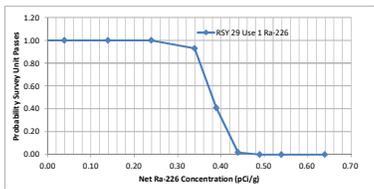
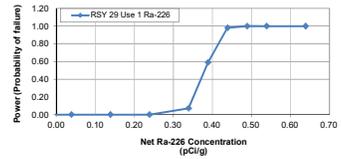
Table with columns: DATA, AREA, ADJUSTED, RANKS, SURVEY UNIT, Location, Associated with, Sorted Ranks, and RANKS. It contains a long list of survey data points for Rn-226, including adjusted values and ranks.

Summary statistics table for SU Data:
Count: 25
SD: 0.126
Median: 0.317
Ref Stats: SU σ: 0.126, Z(-alpha): 2.326, Z(1-beta): 1.645
Critical Value: 1951.9

Number of Samples table:
LBGR: 0.317
A/c: 5.42
N: 25.23
Actual N: 25
SU σ: 0.126
Z(-alpha): 2.326
Z(1-beta): 1.645

POWER CURVE CALCULATION

Power curve calculation table with columns: Concentration, above Background, (C-LBGR), SD, p1, p2, E(Wmw), Var(Wmw), SD(Wmw), z, Power, Probability of passing. It shows power values for various concentrations.



QUANTILE TEST

From NUREG 1505, Table A.7b Values of 'r' and 'k' for the Quantile Test When alpha is Approximately 0.025

Use: m = 100, n = 25, f = 4, k = 3, alpha = 0.025

If k or more of the r largest measurements in the combined ranked data set are from the survey unit, the null hypothesis of the Quantile test (that there is no residual radioactivity above the LBGR in any part of the survey unit) is rejected.

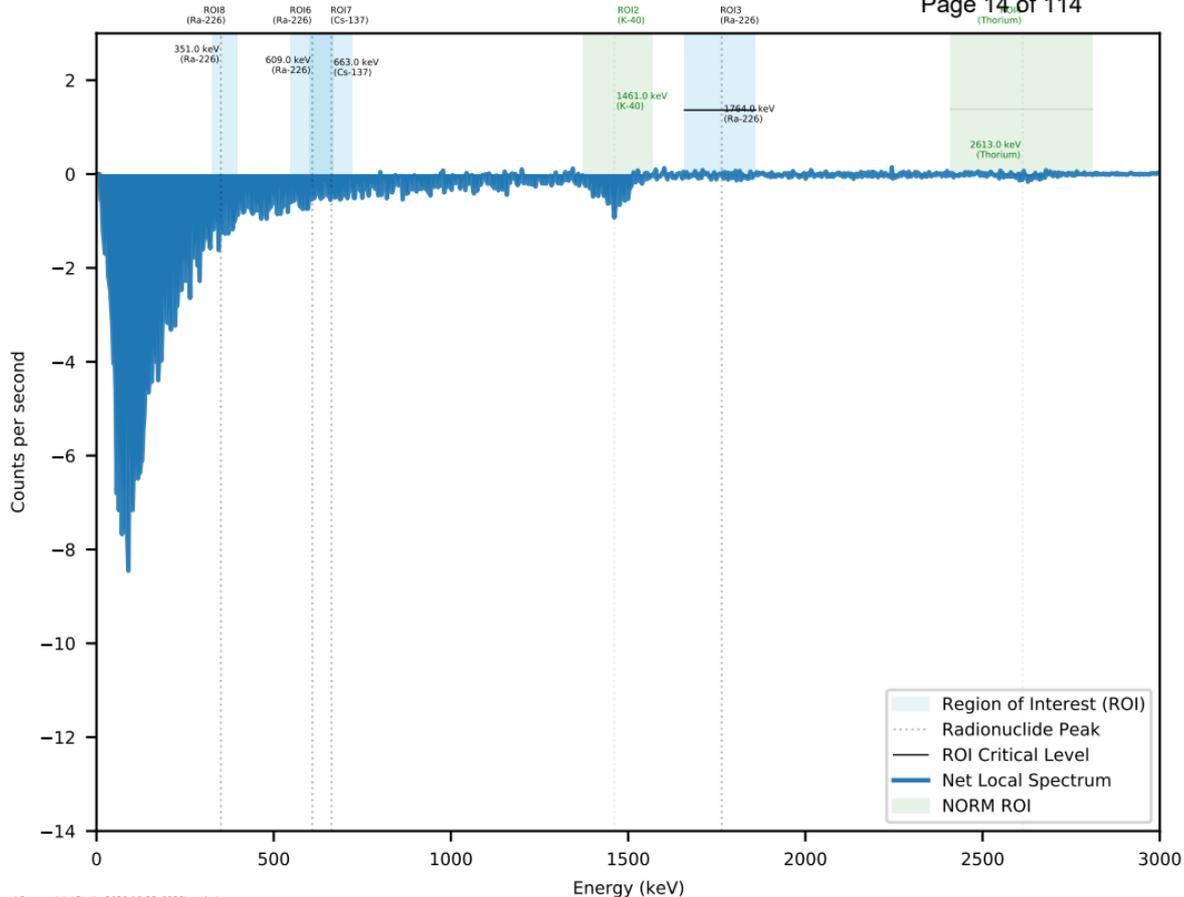
0 of the largest 4 adjusted measurements are from S. The null hypothesis is accepted.

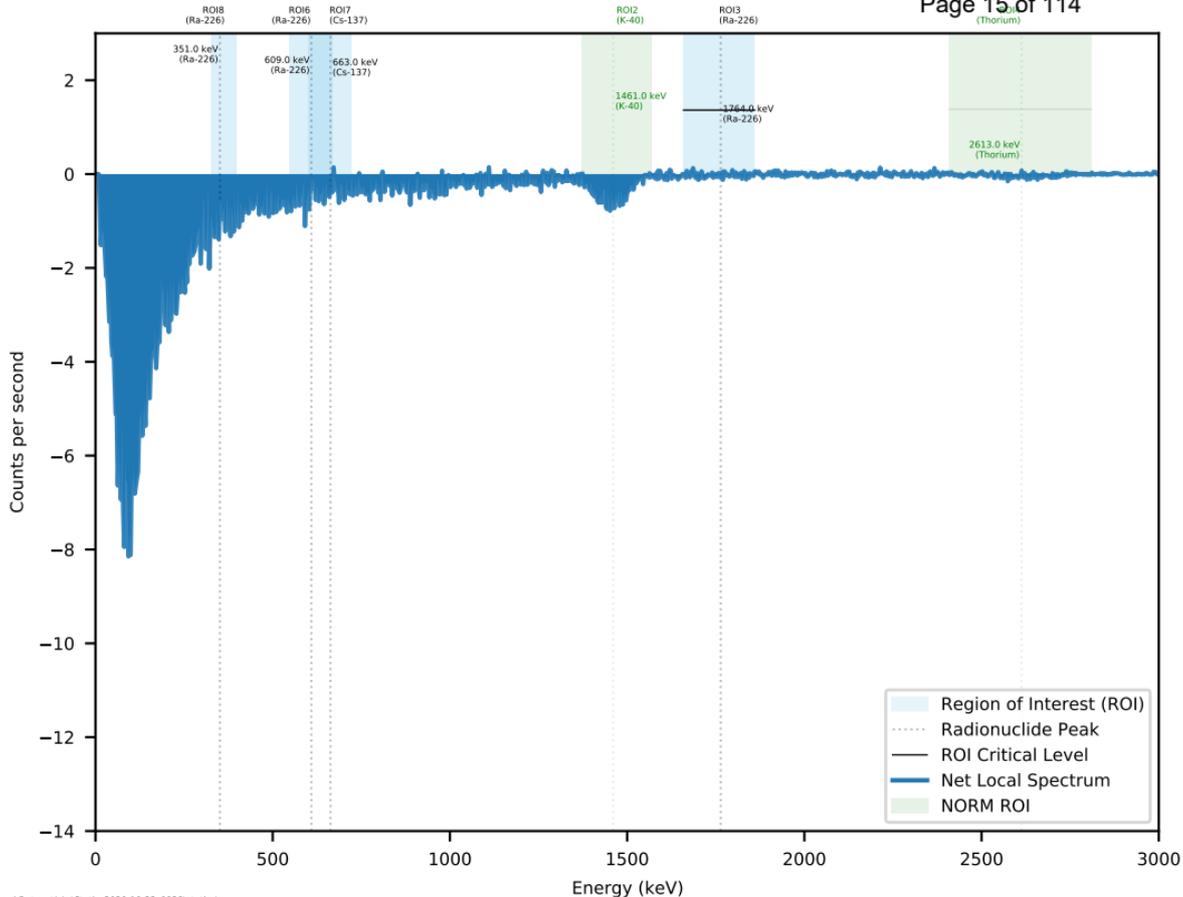
of R: 100, # of S: 25, Avg Rank R: 75.5, Avg Rank S: 13

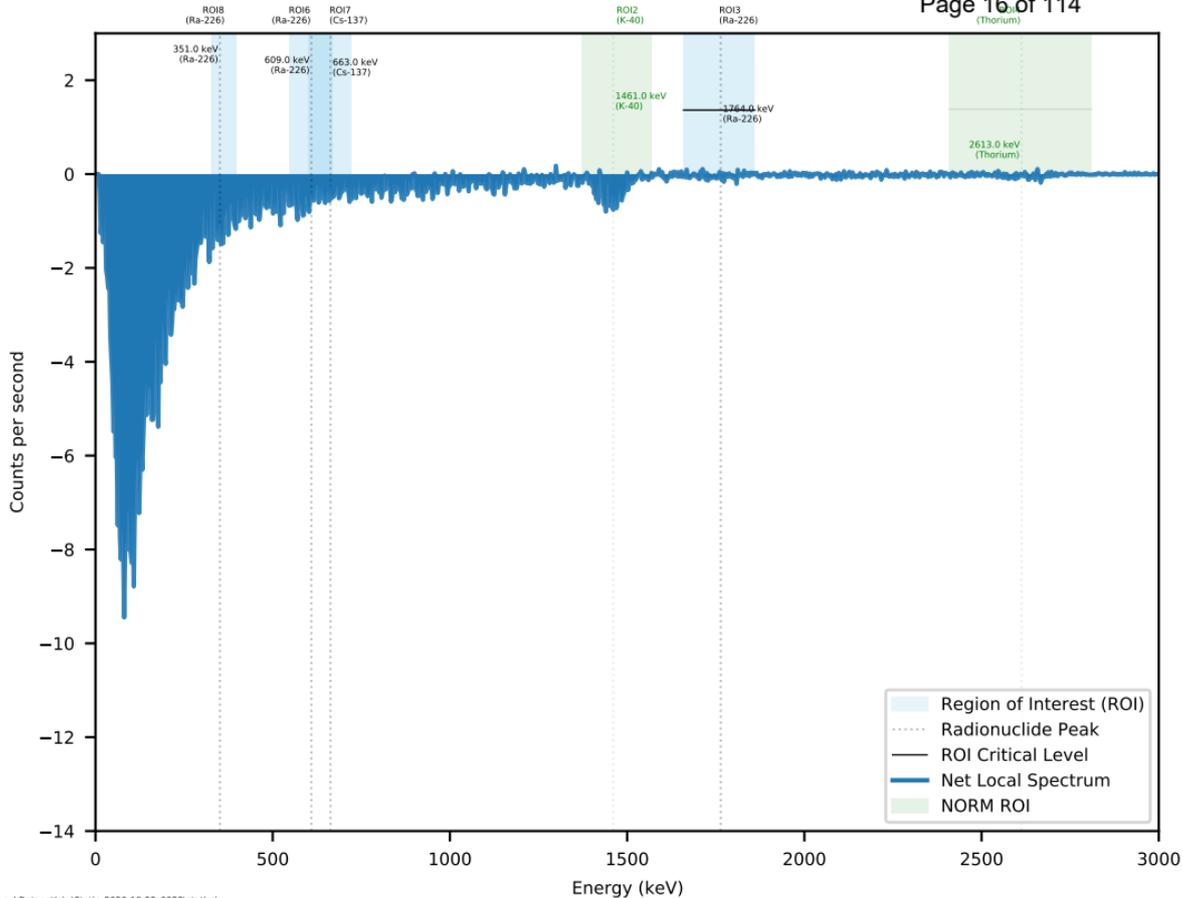
For m or n greater than 20, the critical value (k) can be calculated from the formula: k = floor((m(n+1))/2 + z * sqrt(mn(n+m+1)/12))

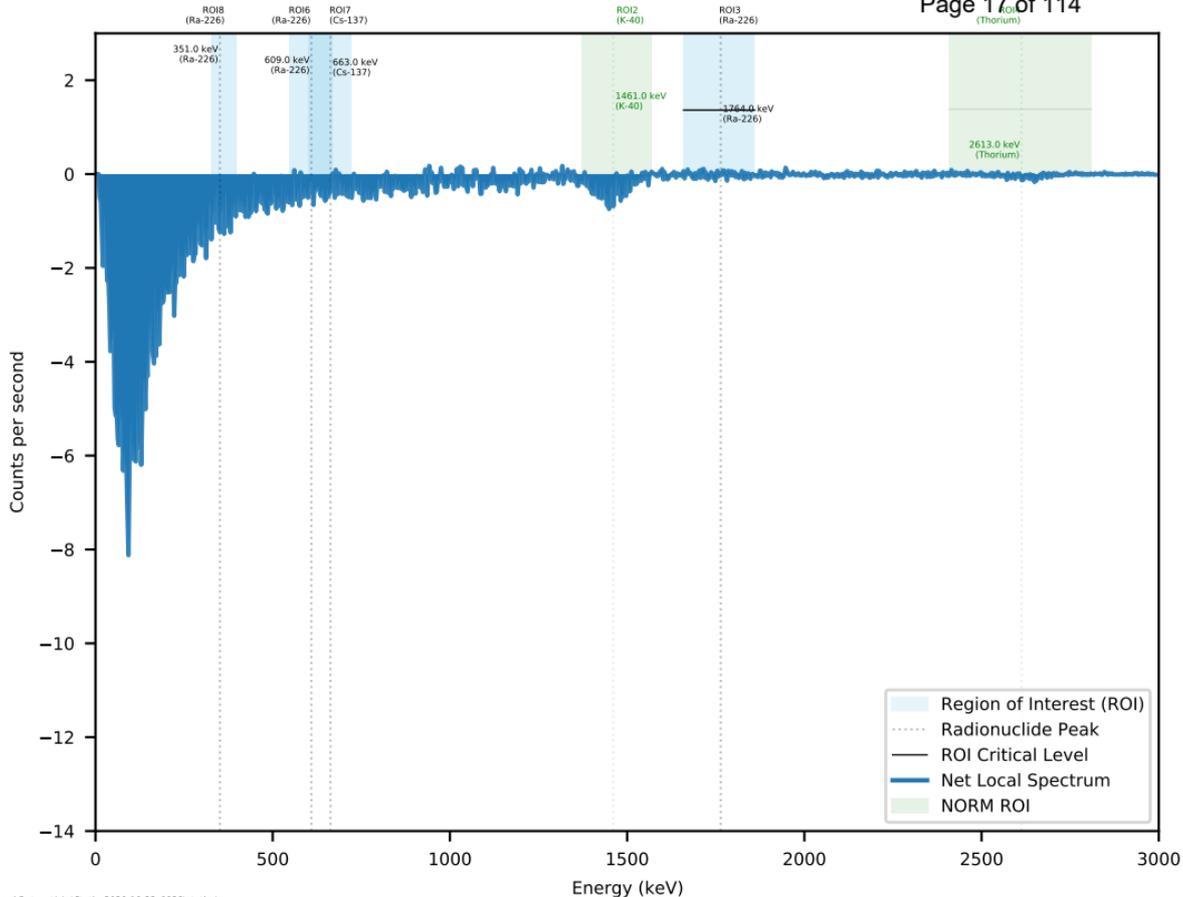
z = 99.0% percentile of standard normal distribution = 2.326, k = 1951.9

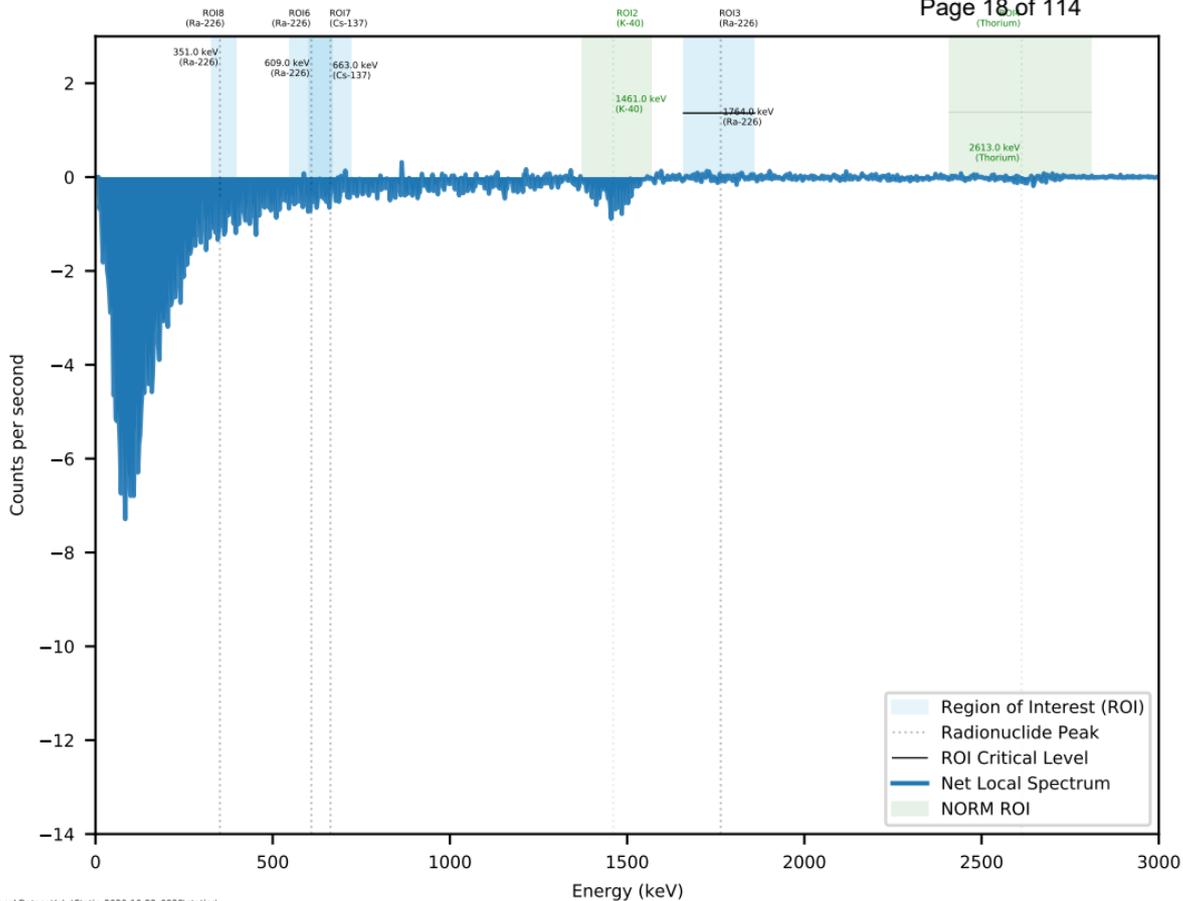
Since the sum of survey unit ranks is less than the critical value, the null hypothesis that the survey unit concentrations do not exceed the LBGR is accepted (i.e., survey unit passes). alpha = 0.01, beta = 0.05

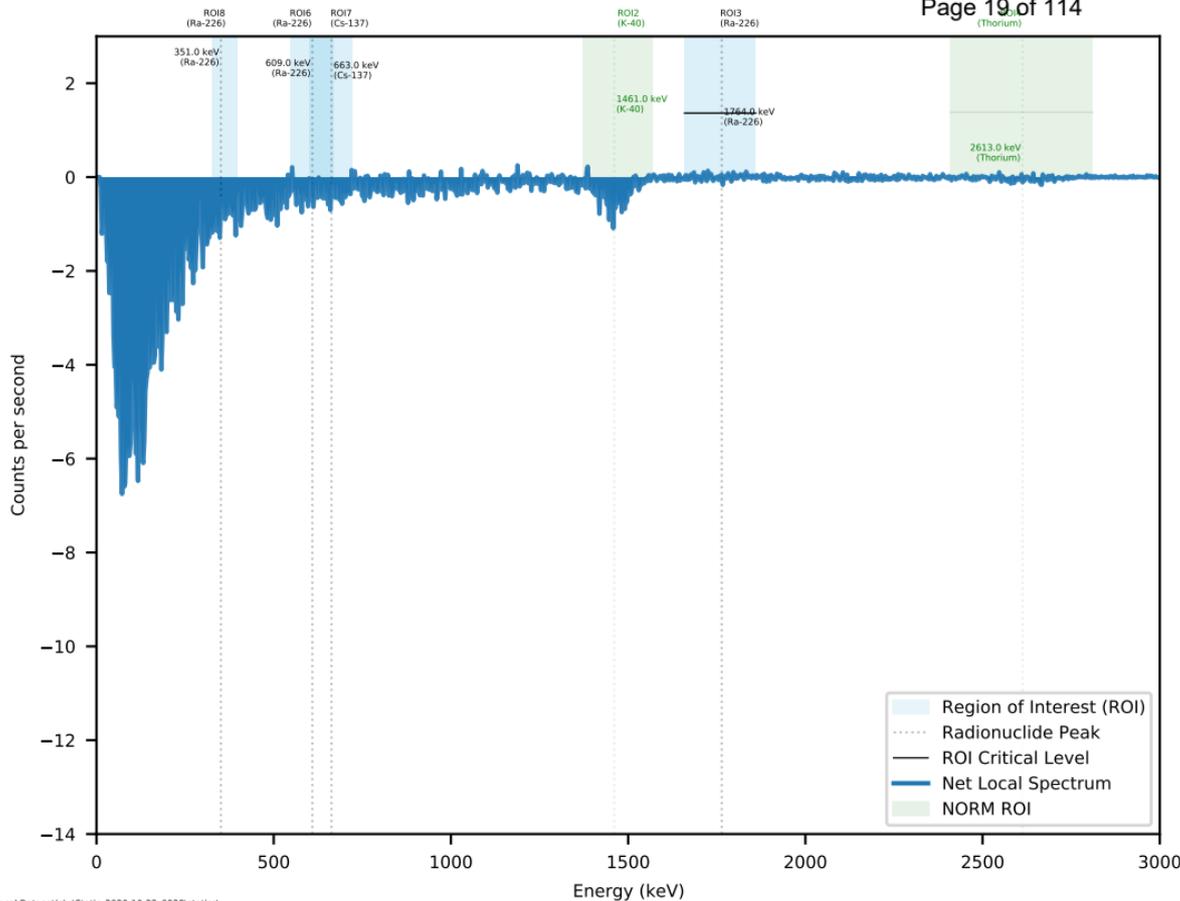


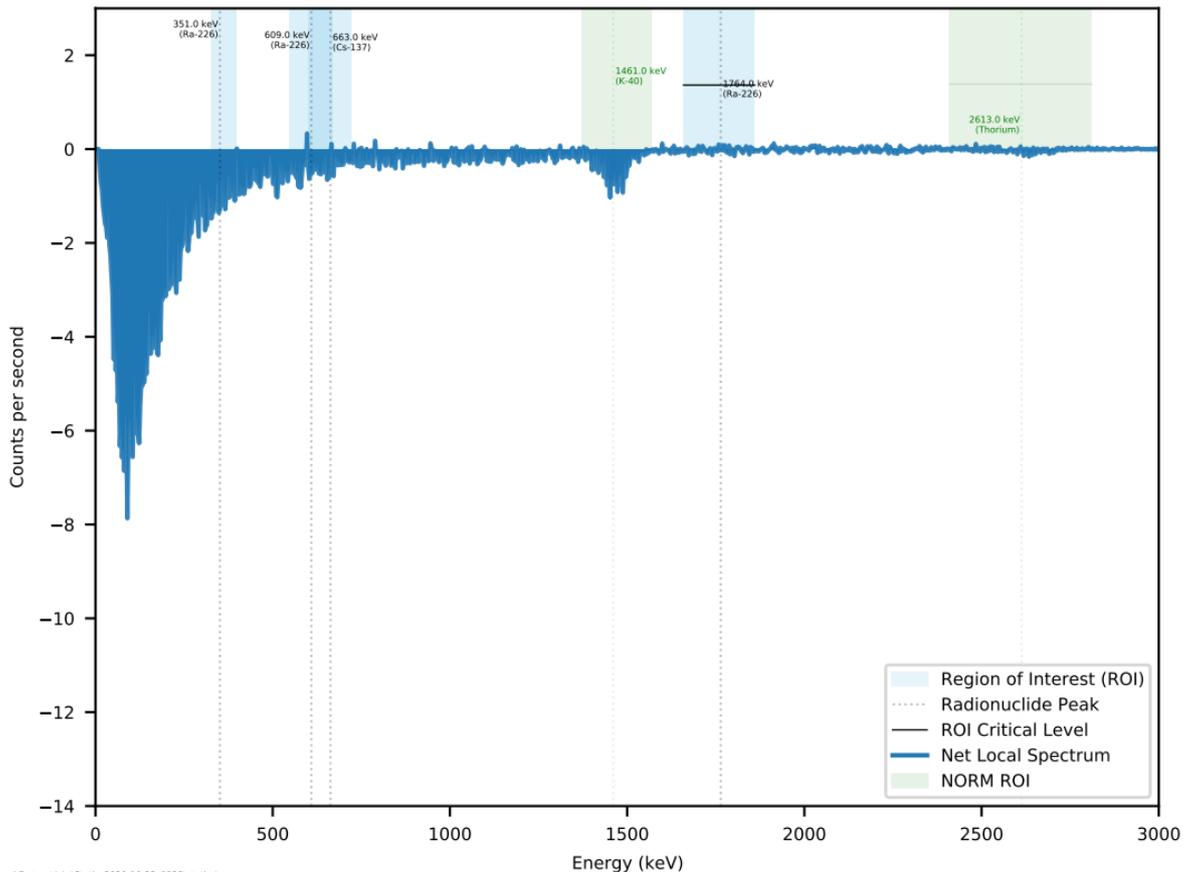


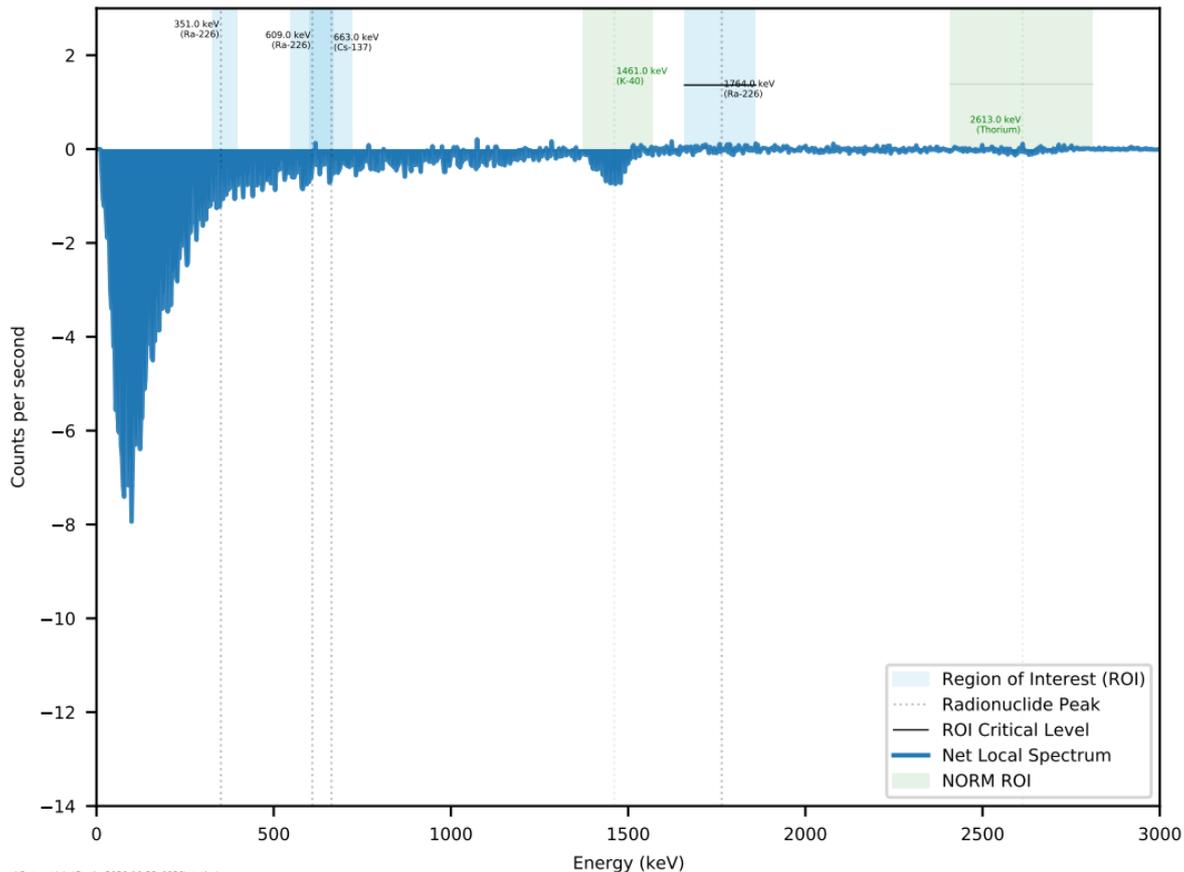


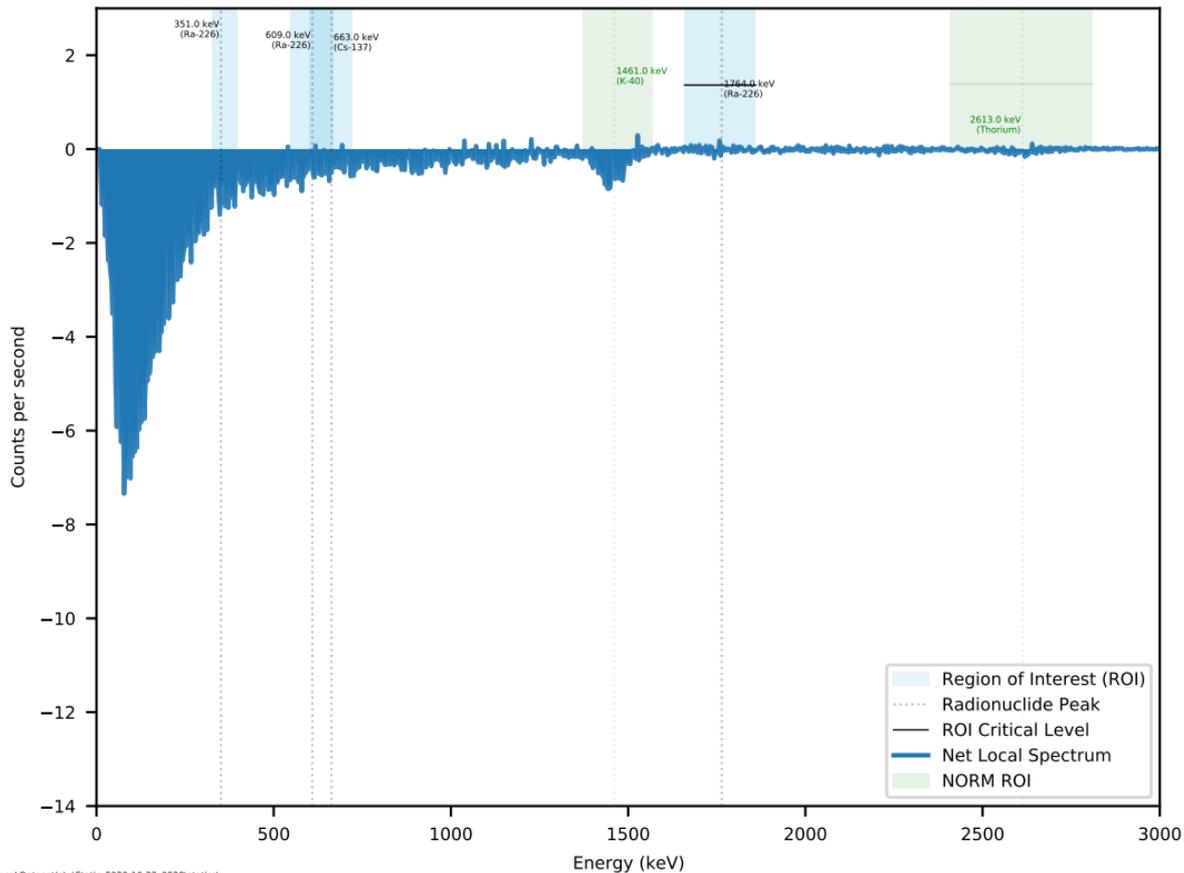


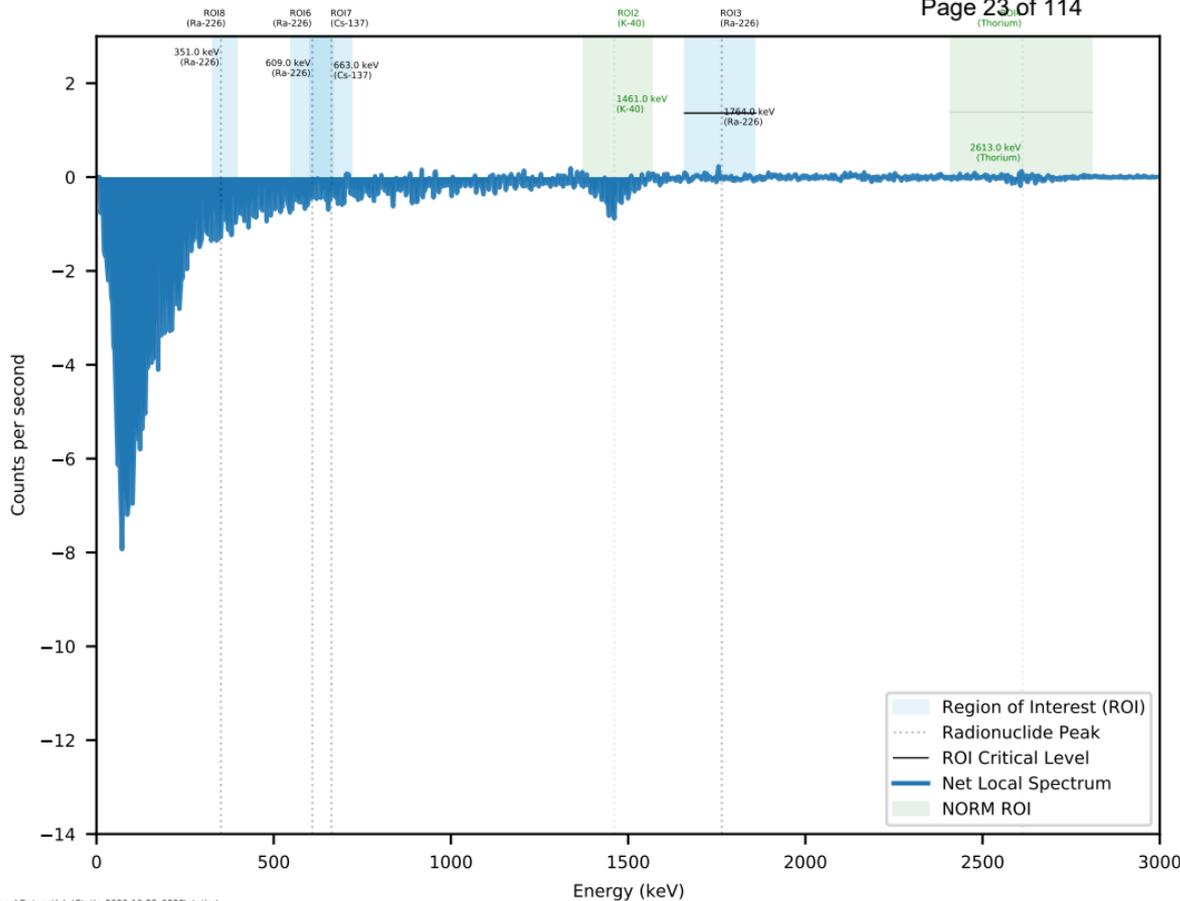


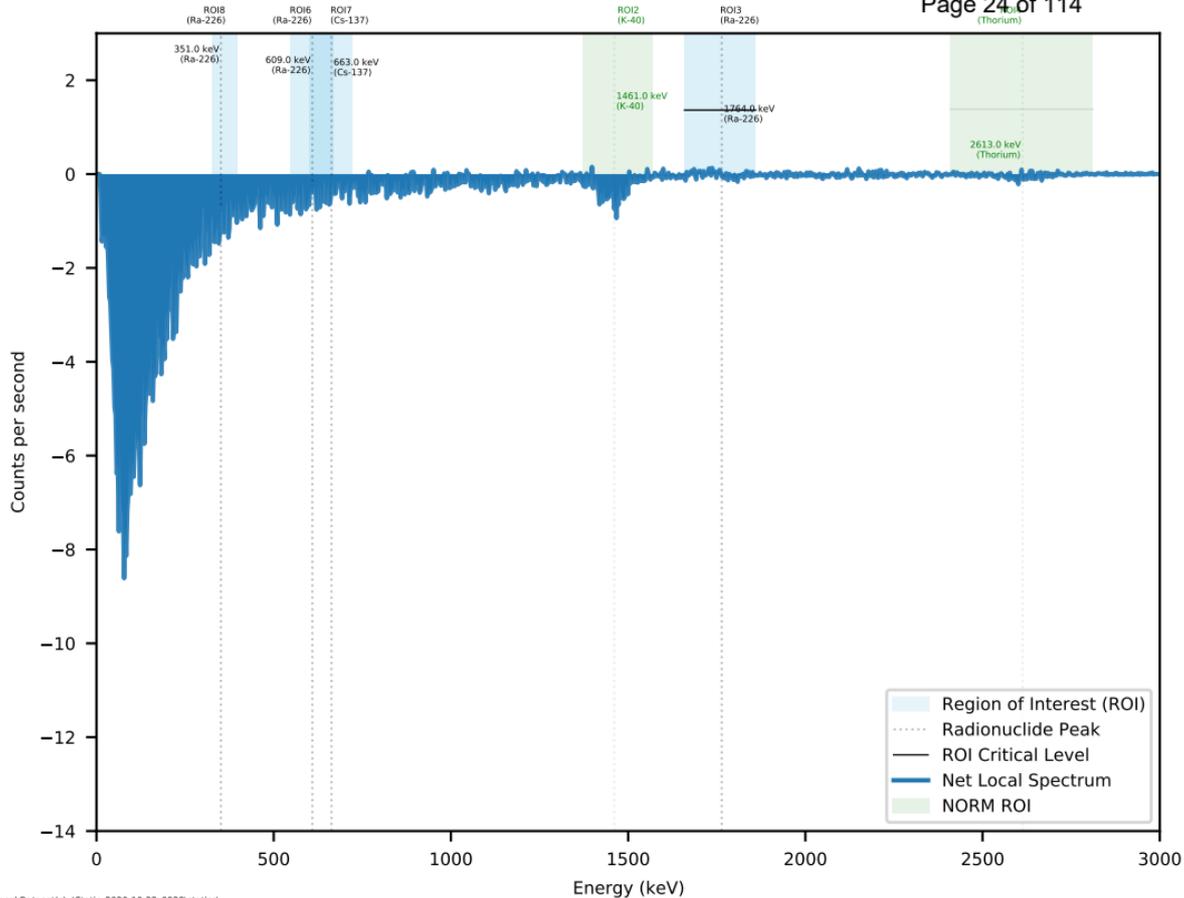


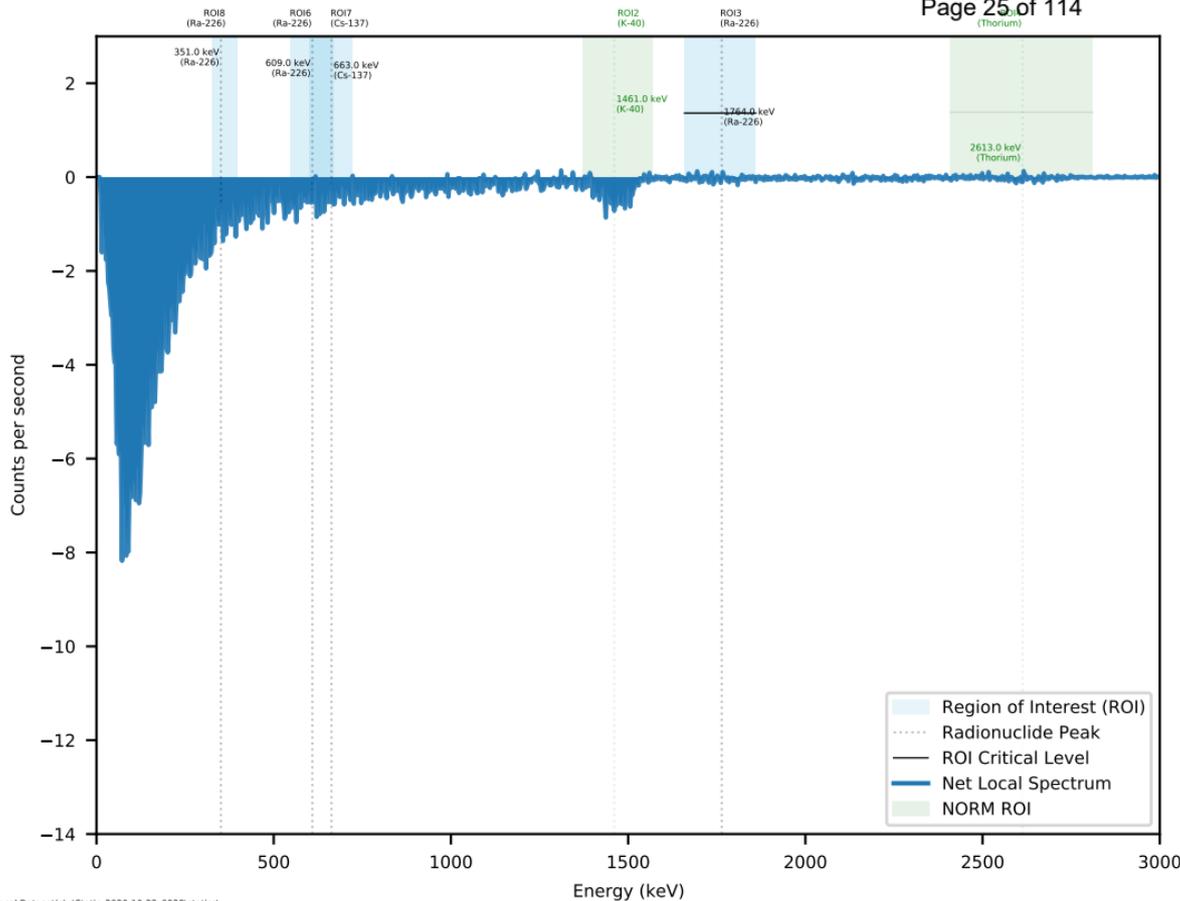


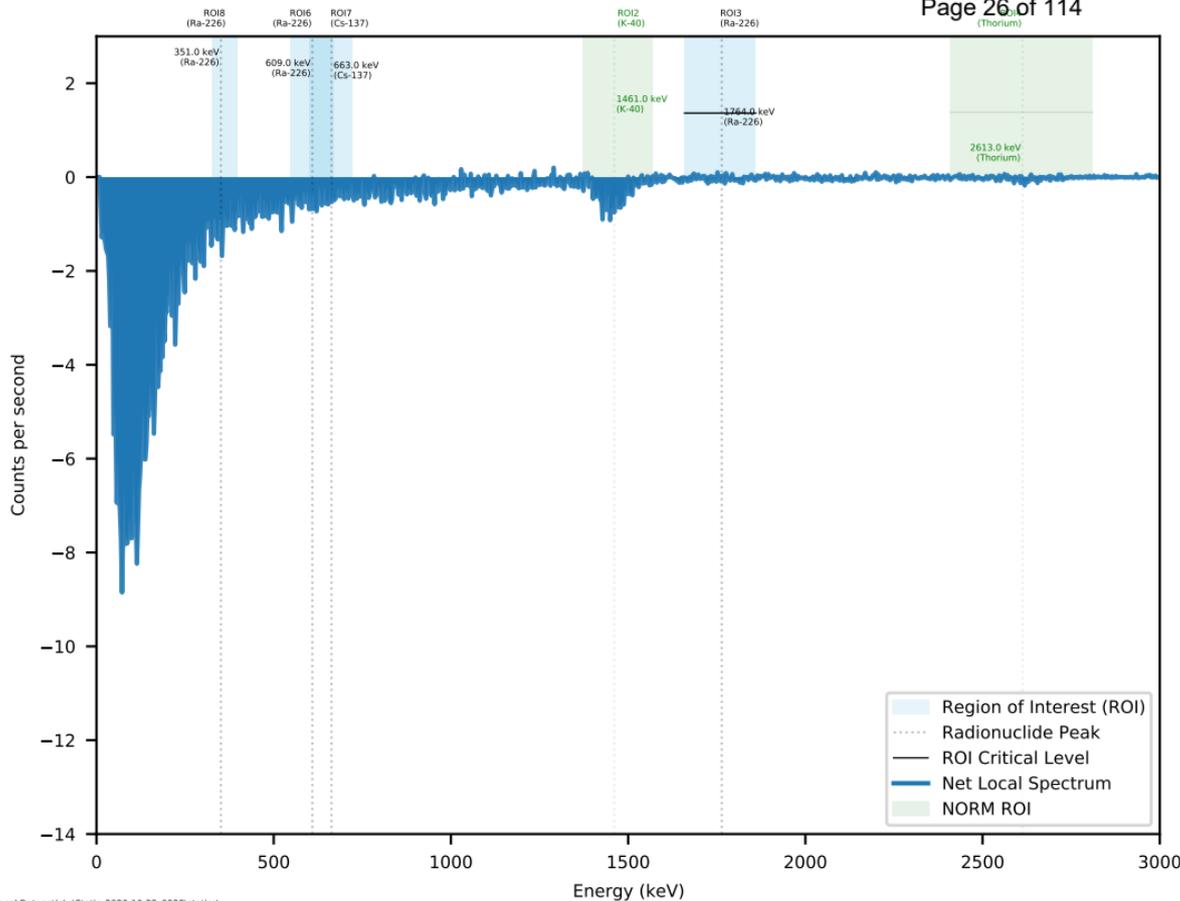


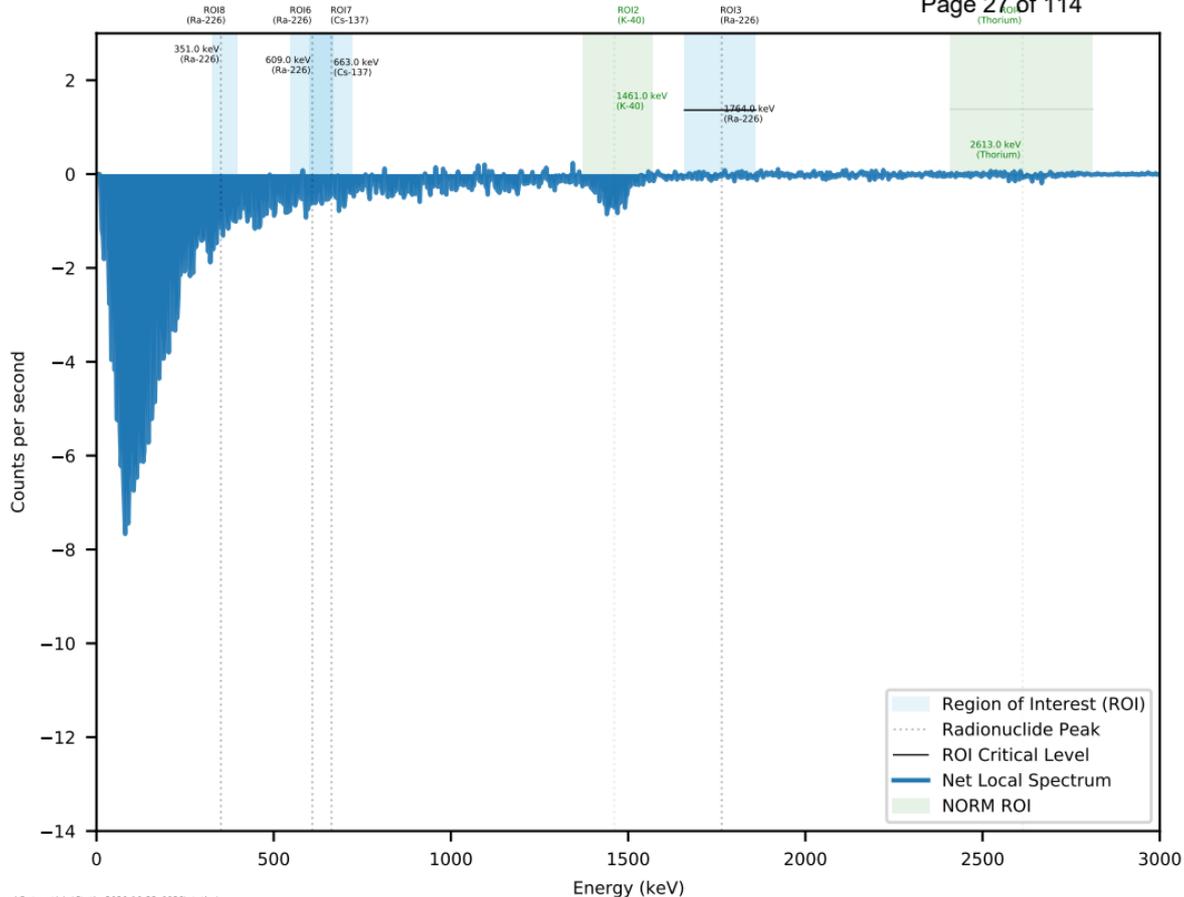


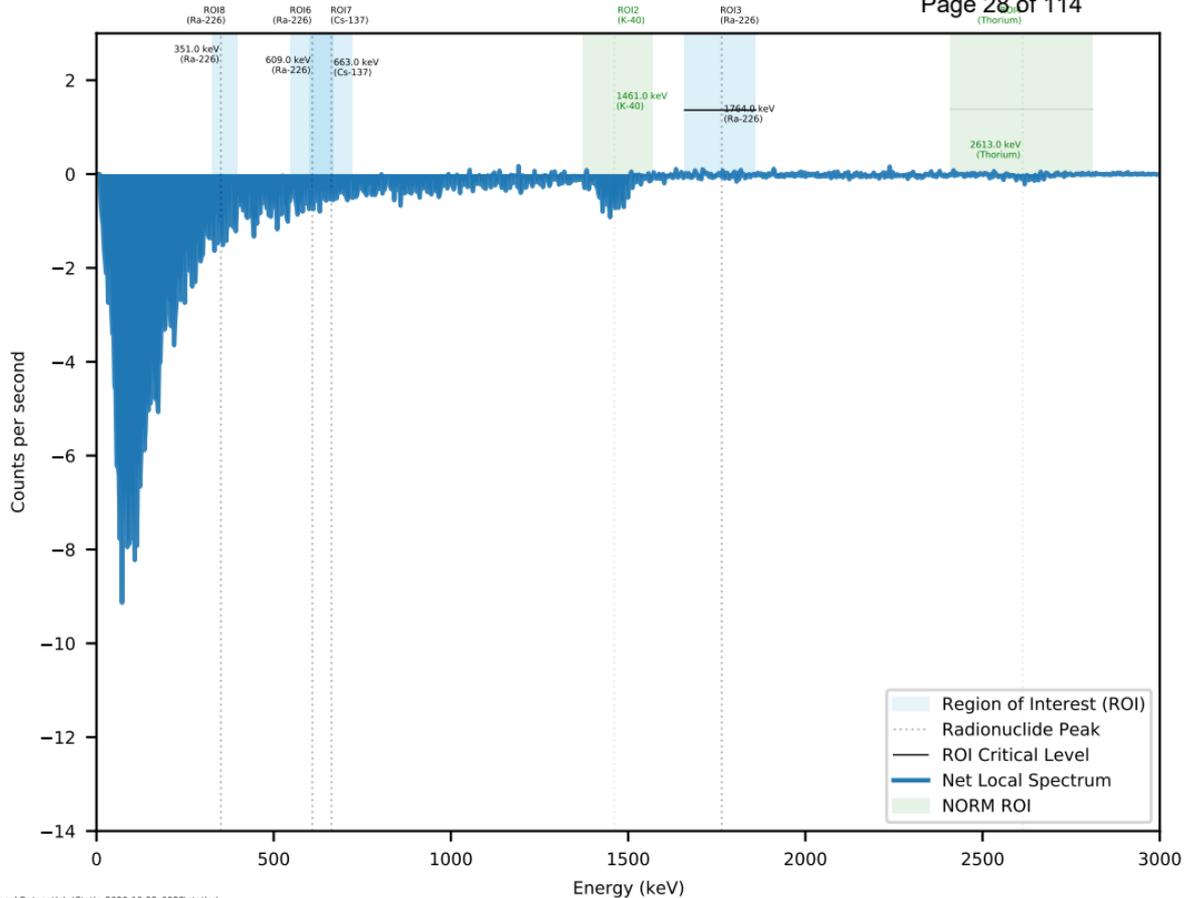


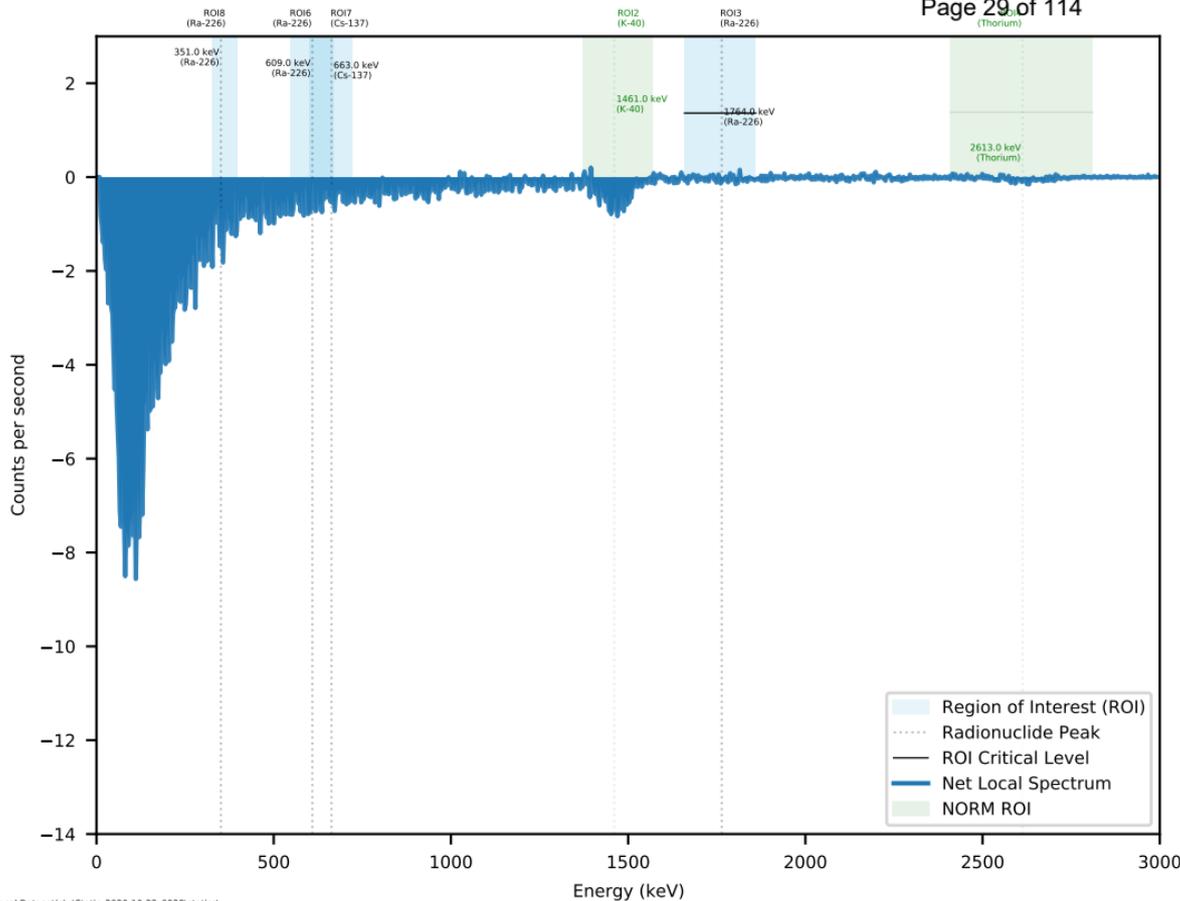


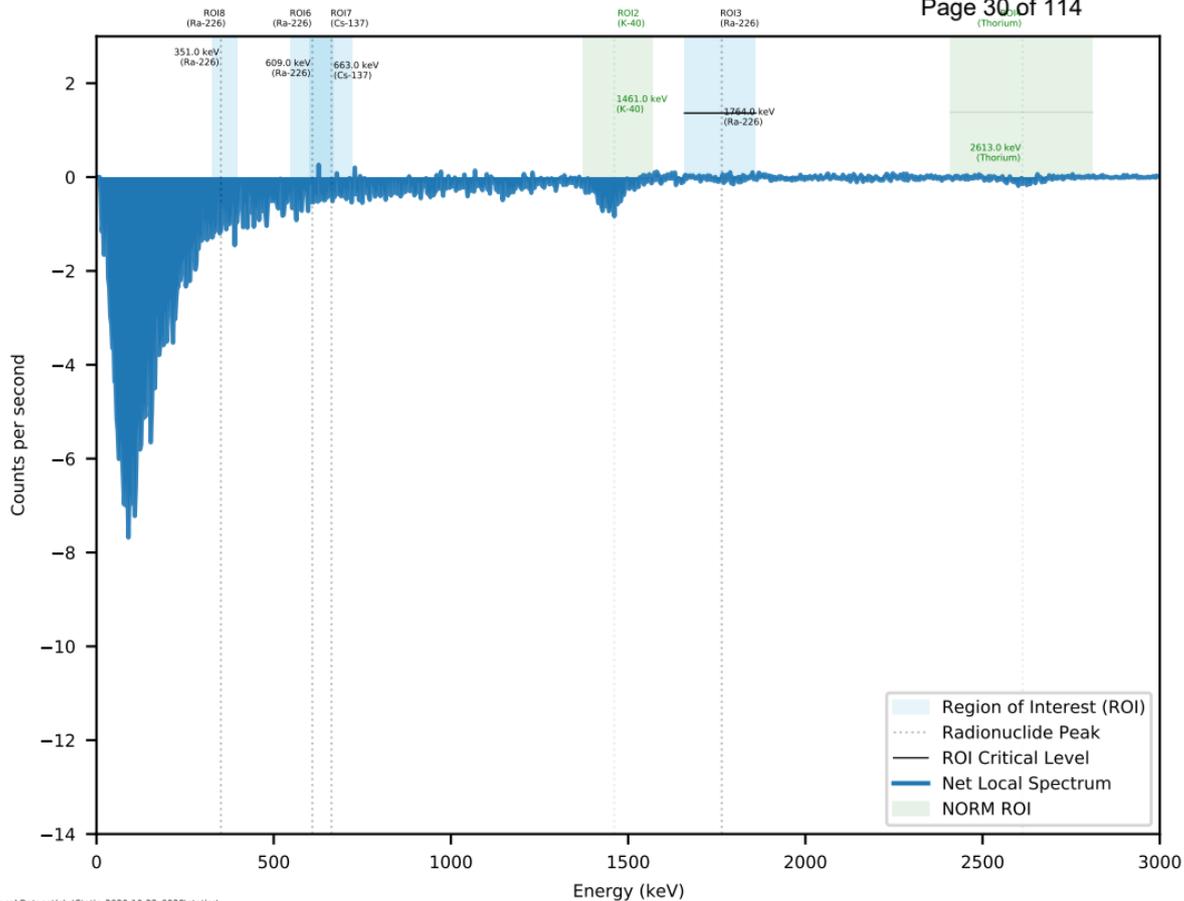


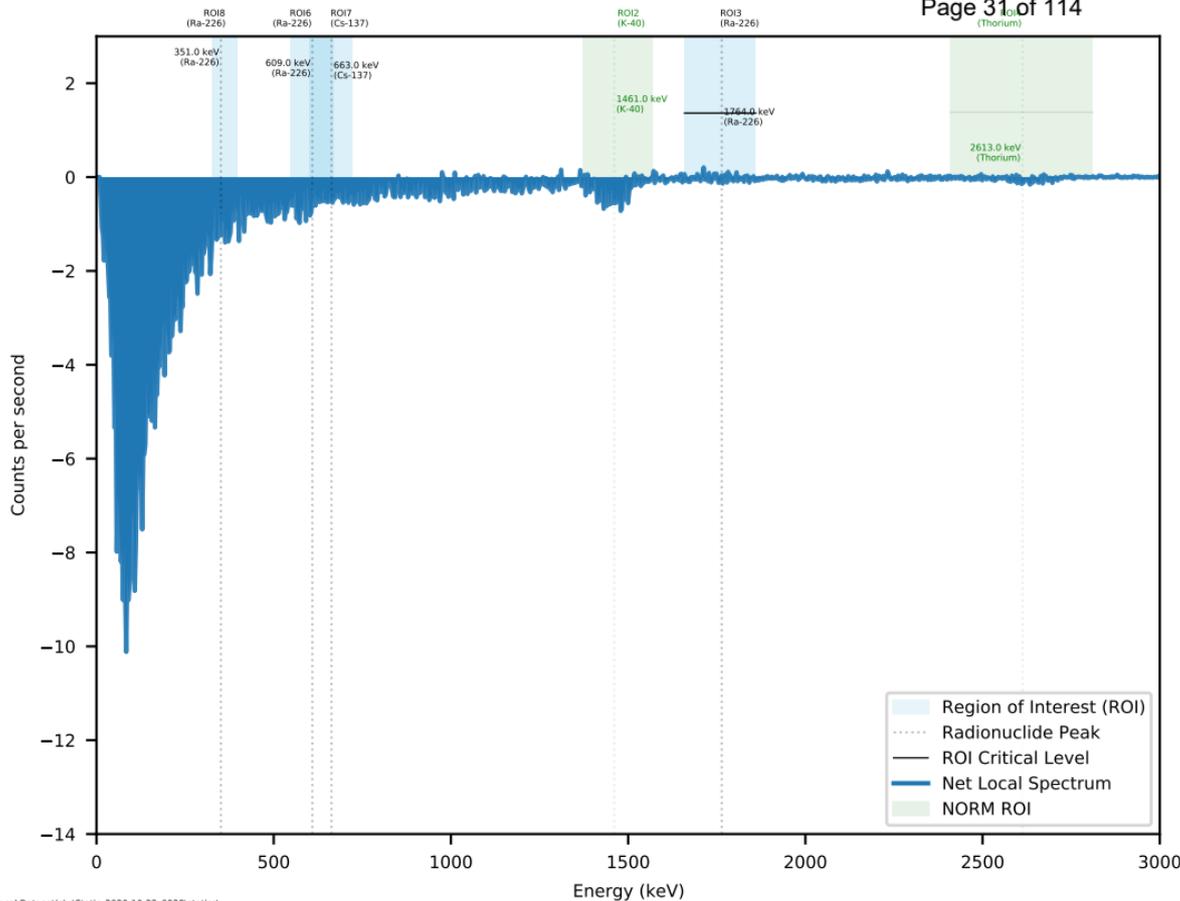


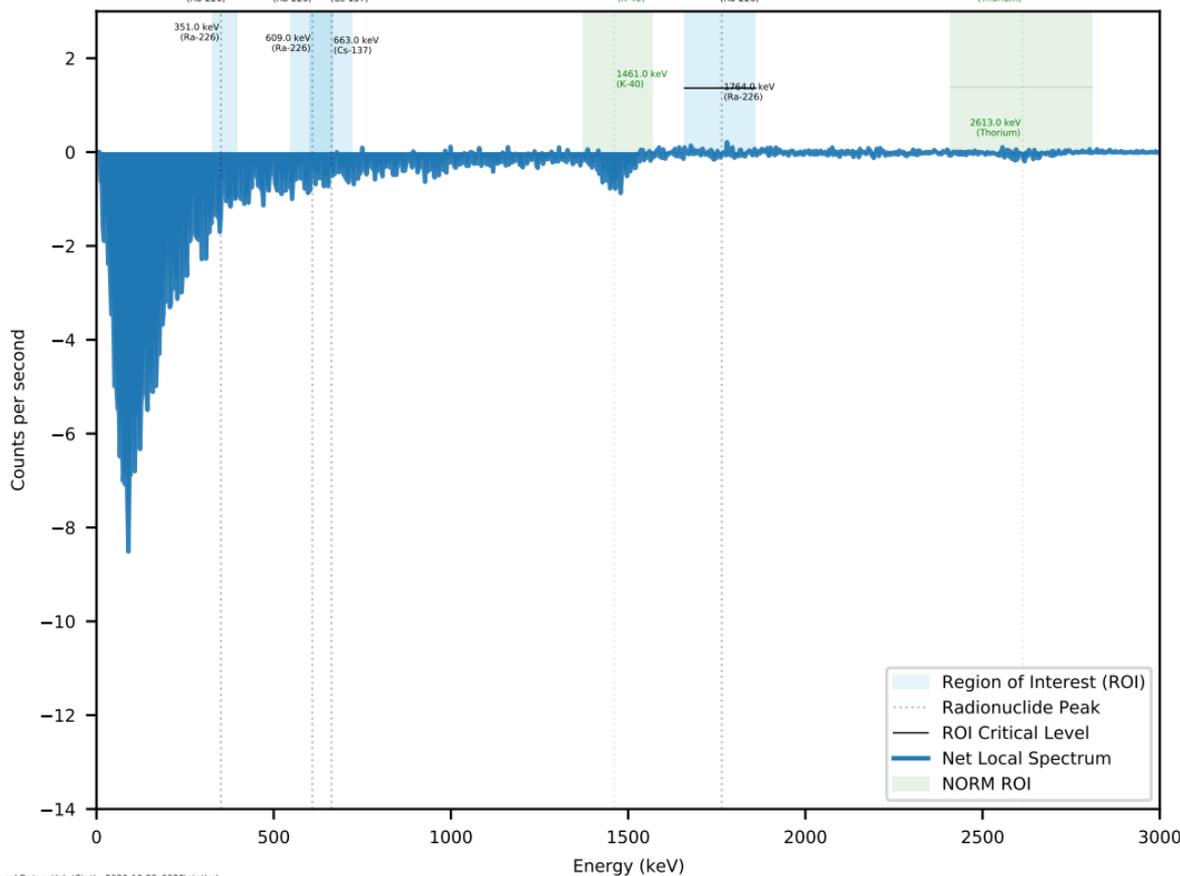


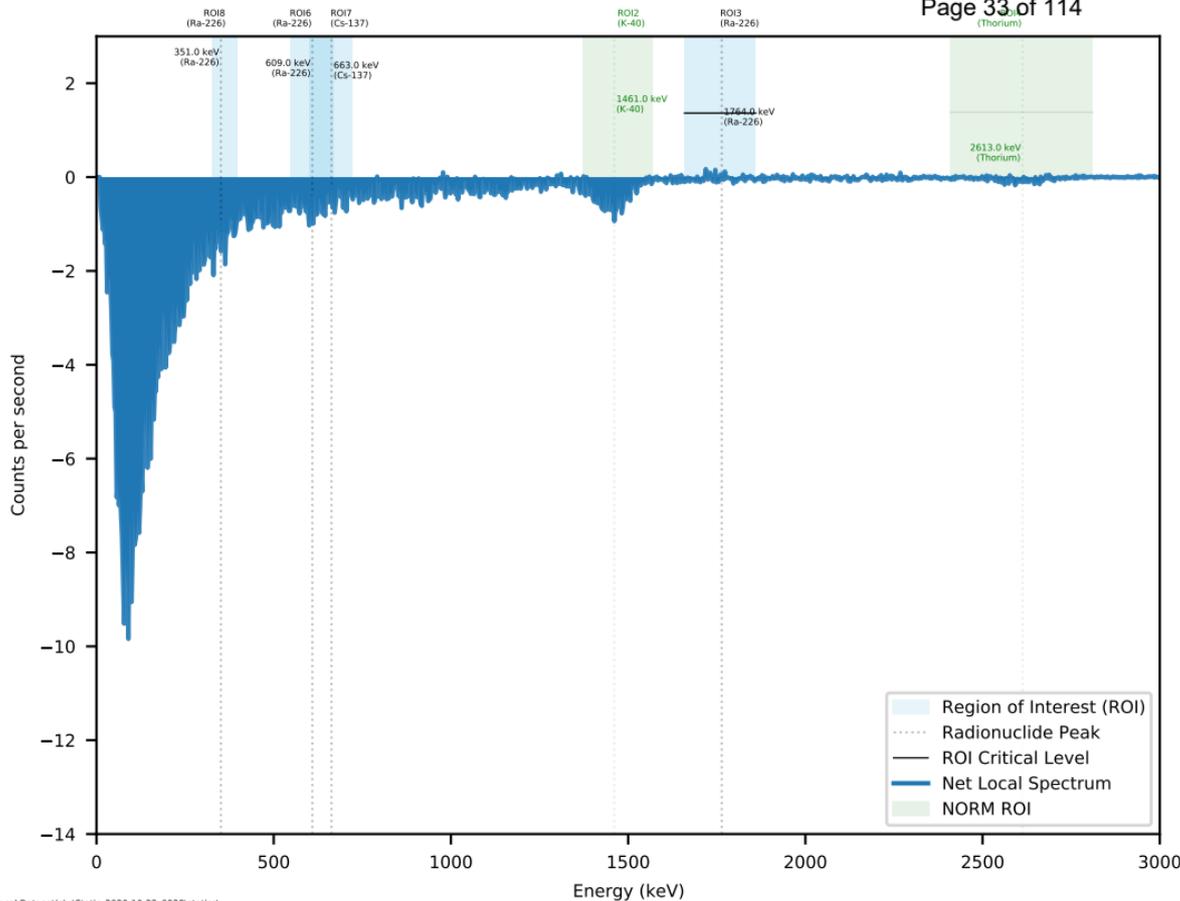


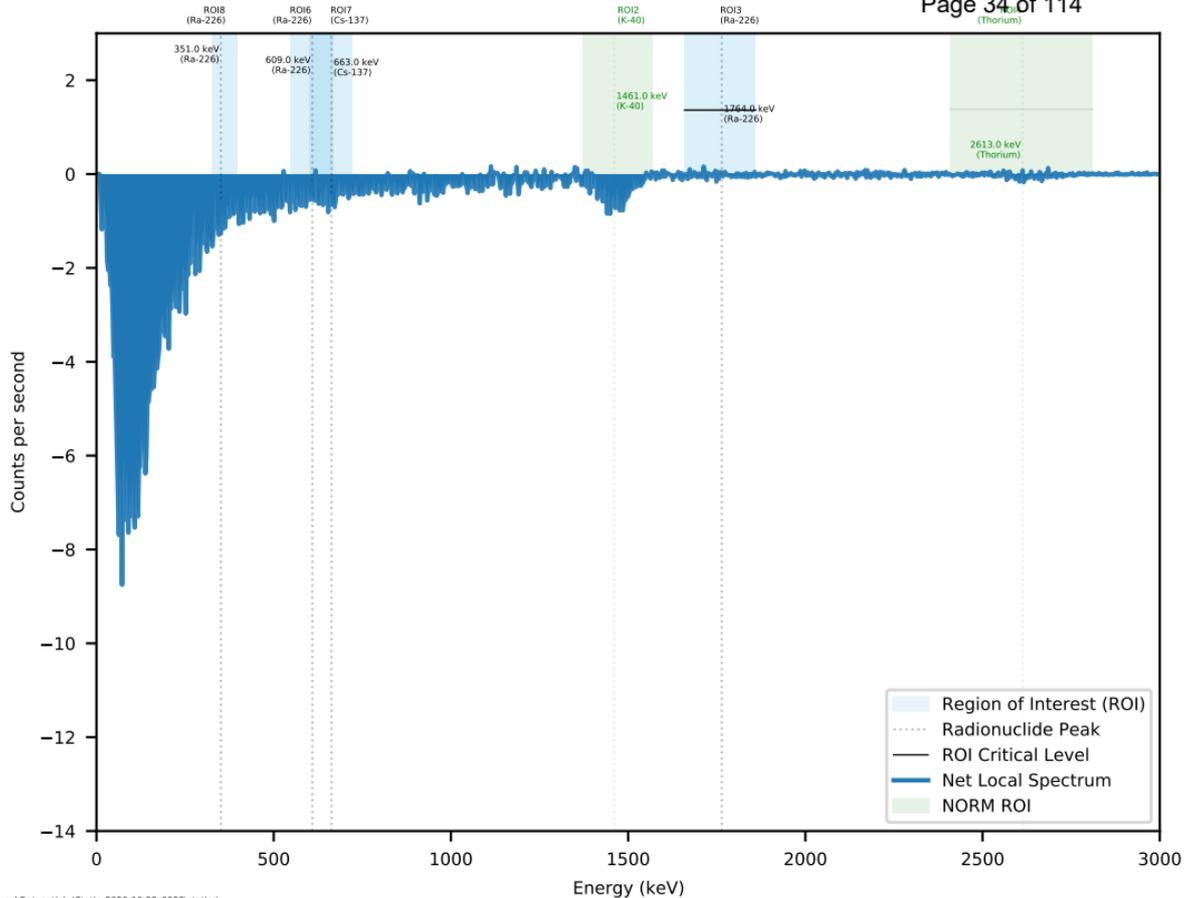


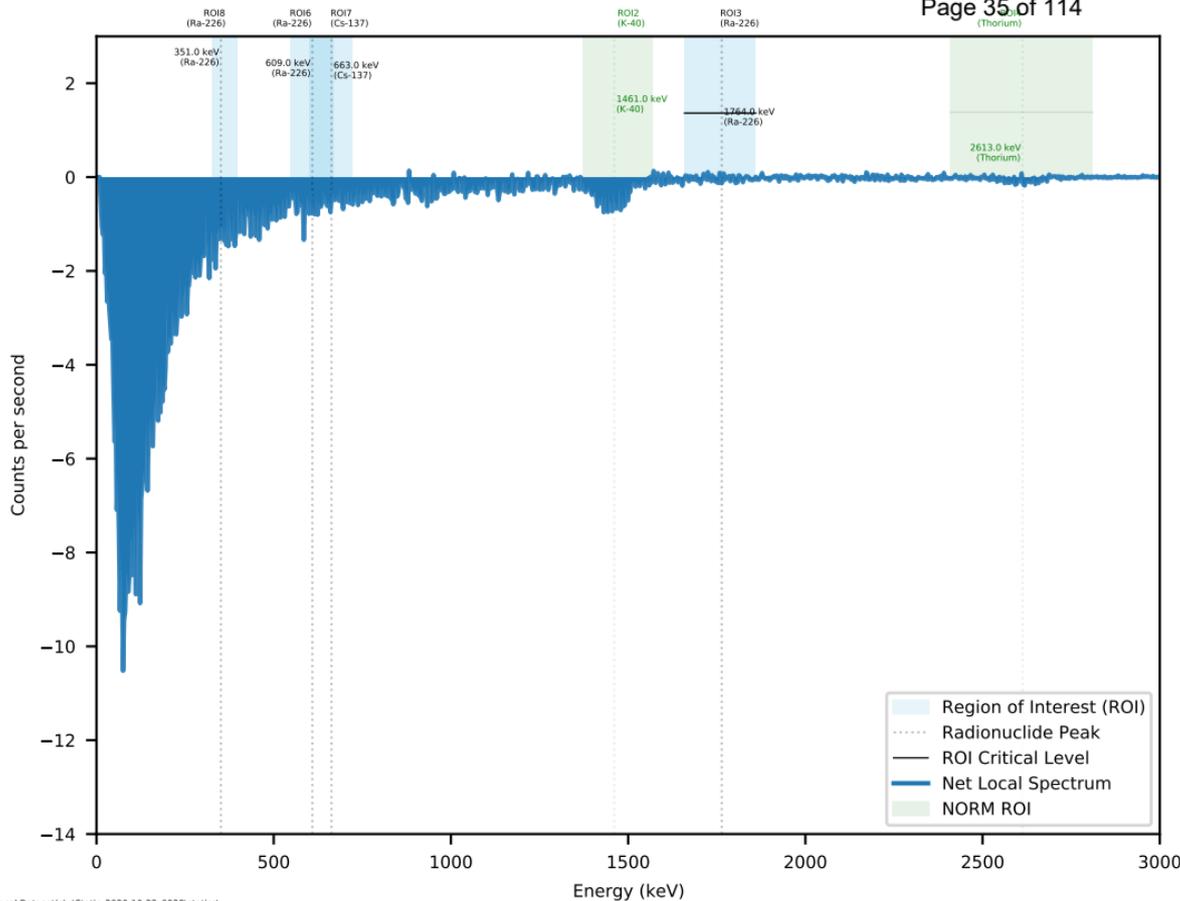


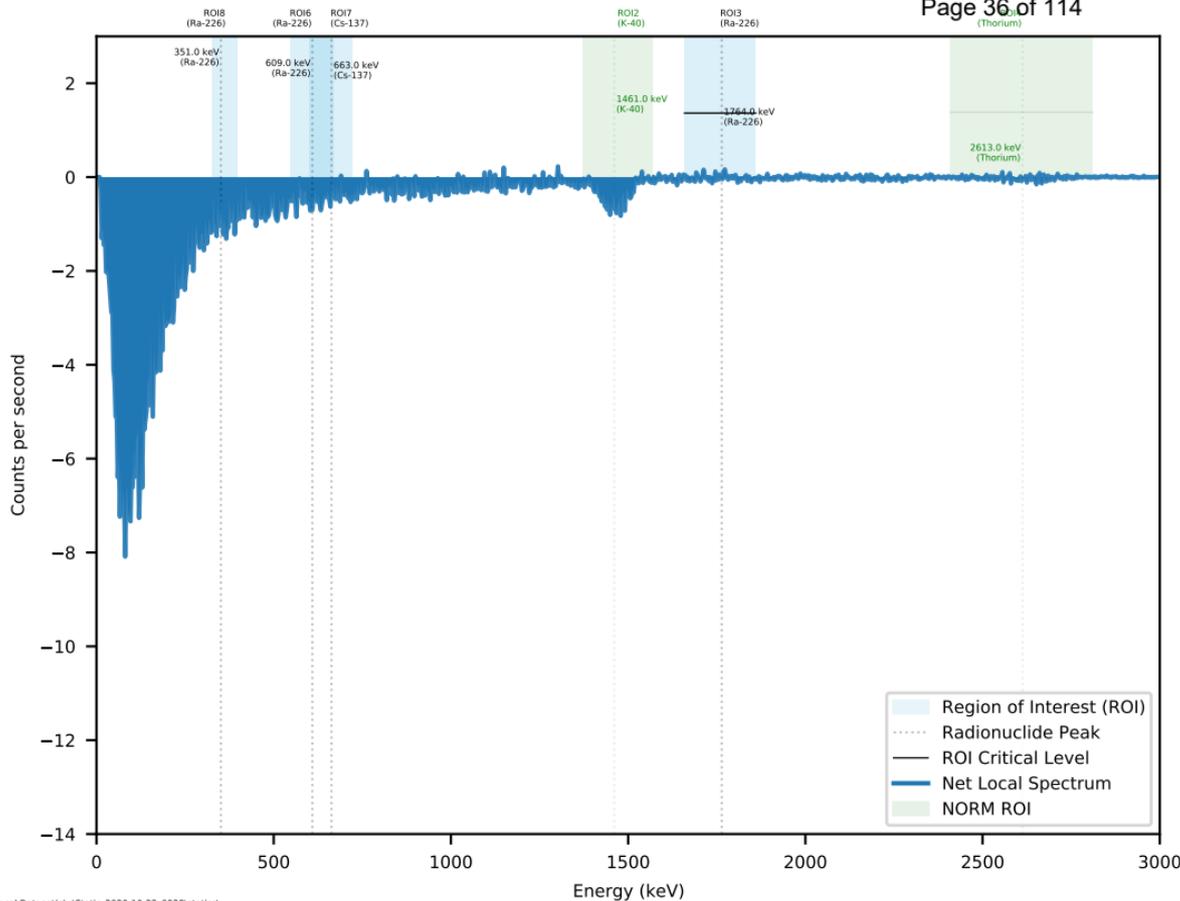


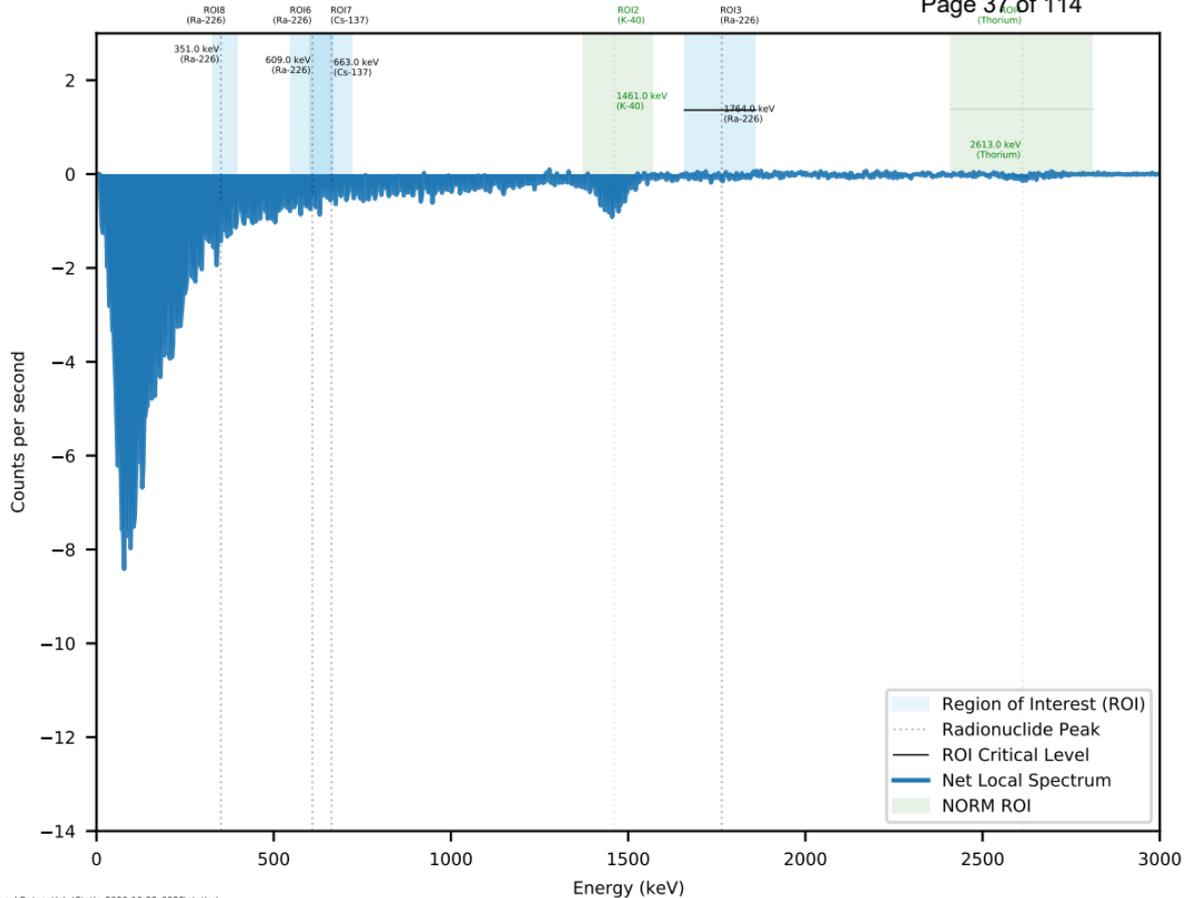


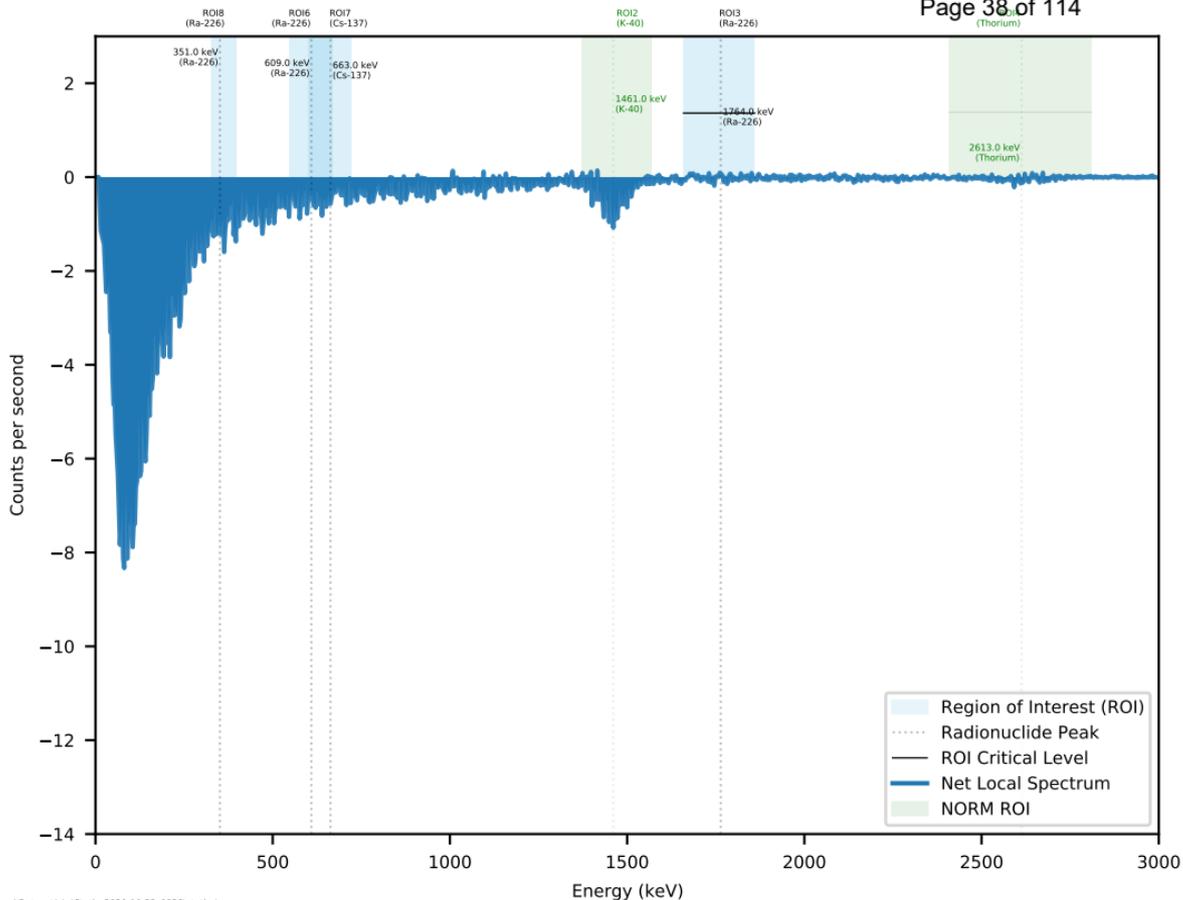


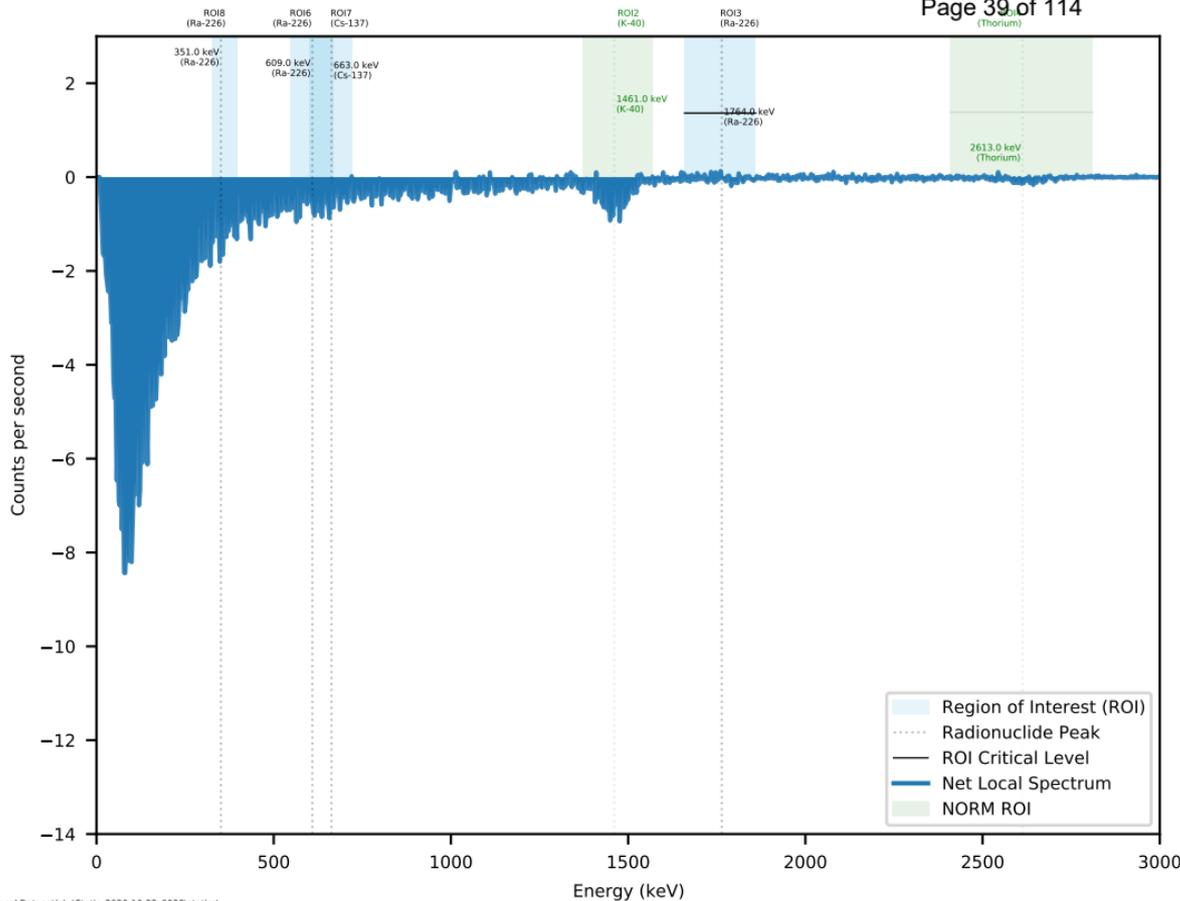


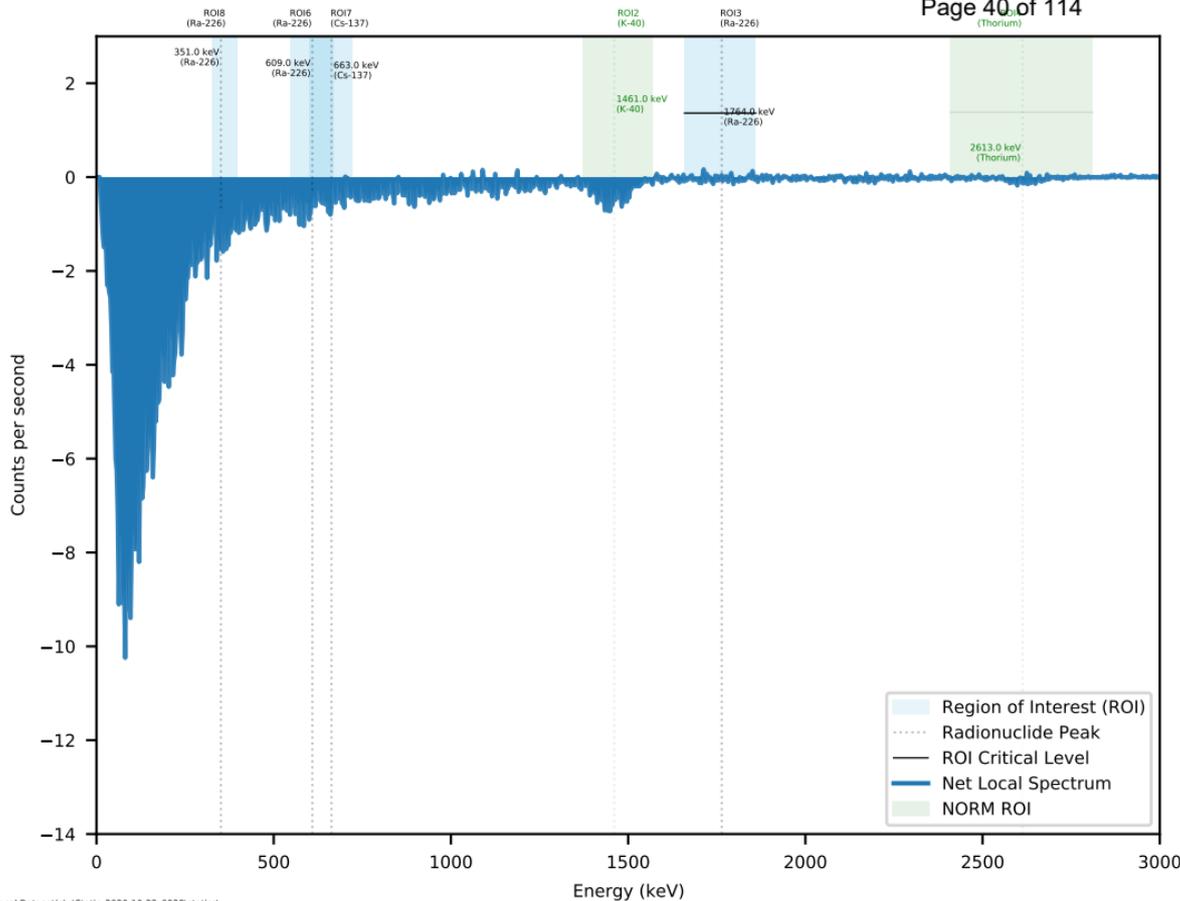


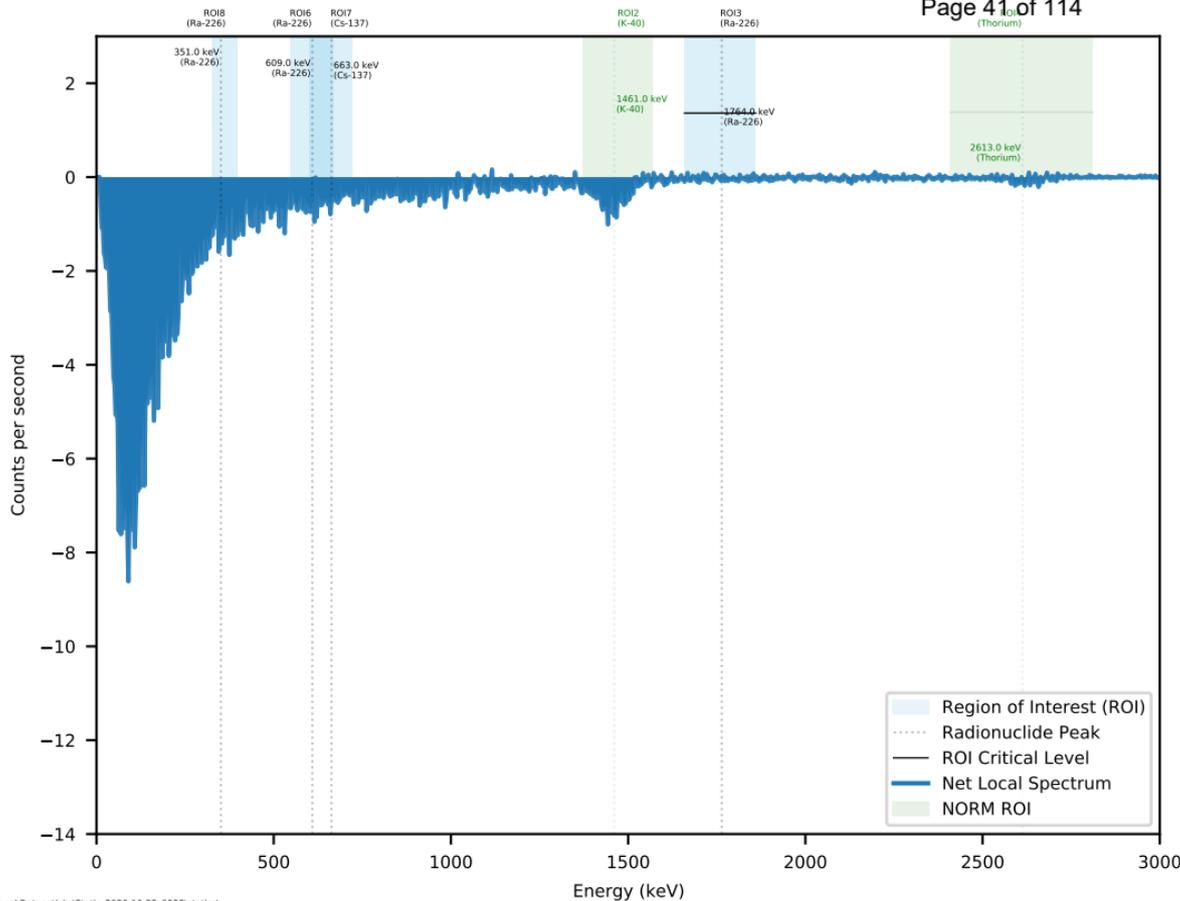


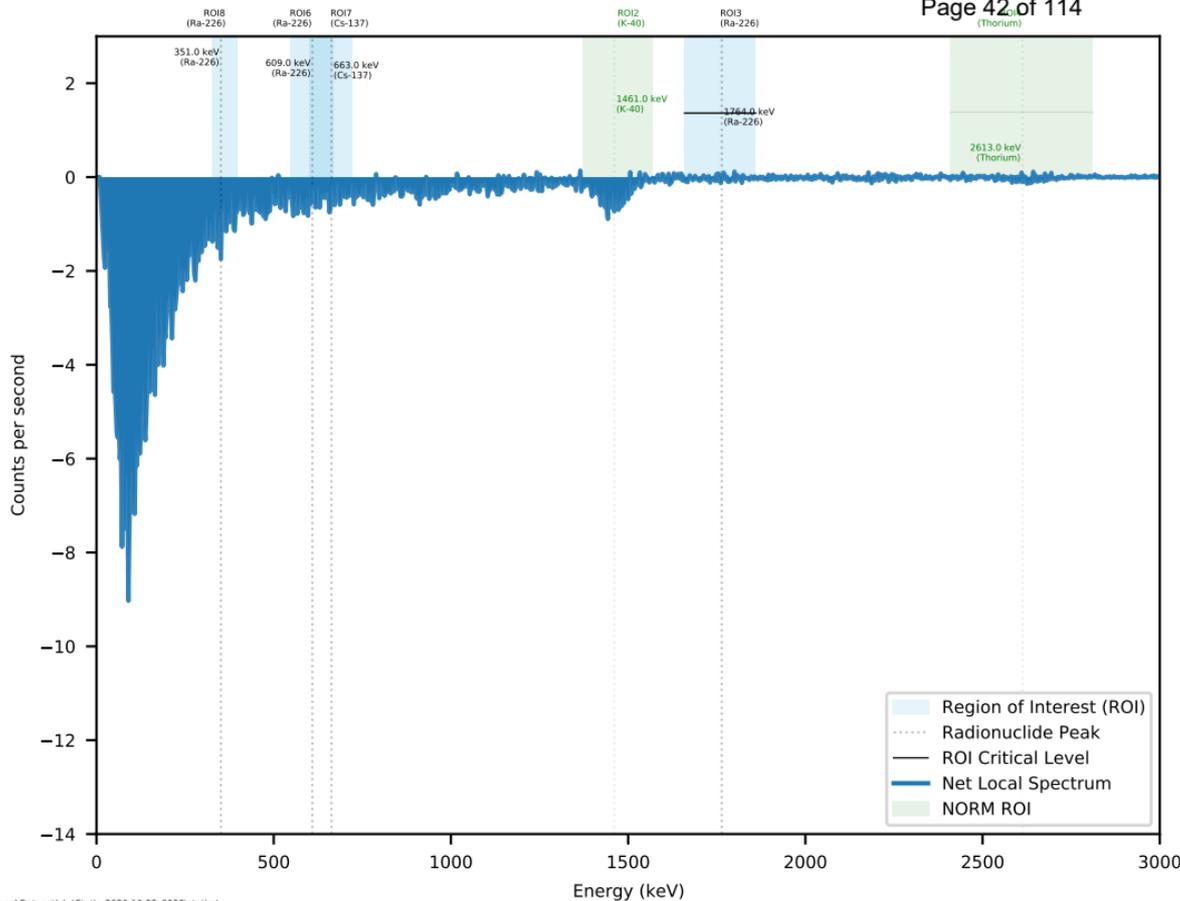


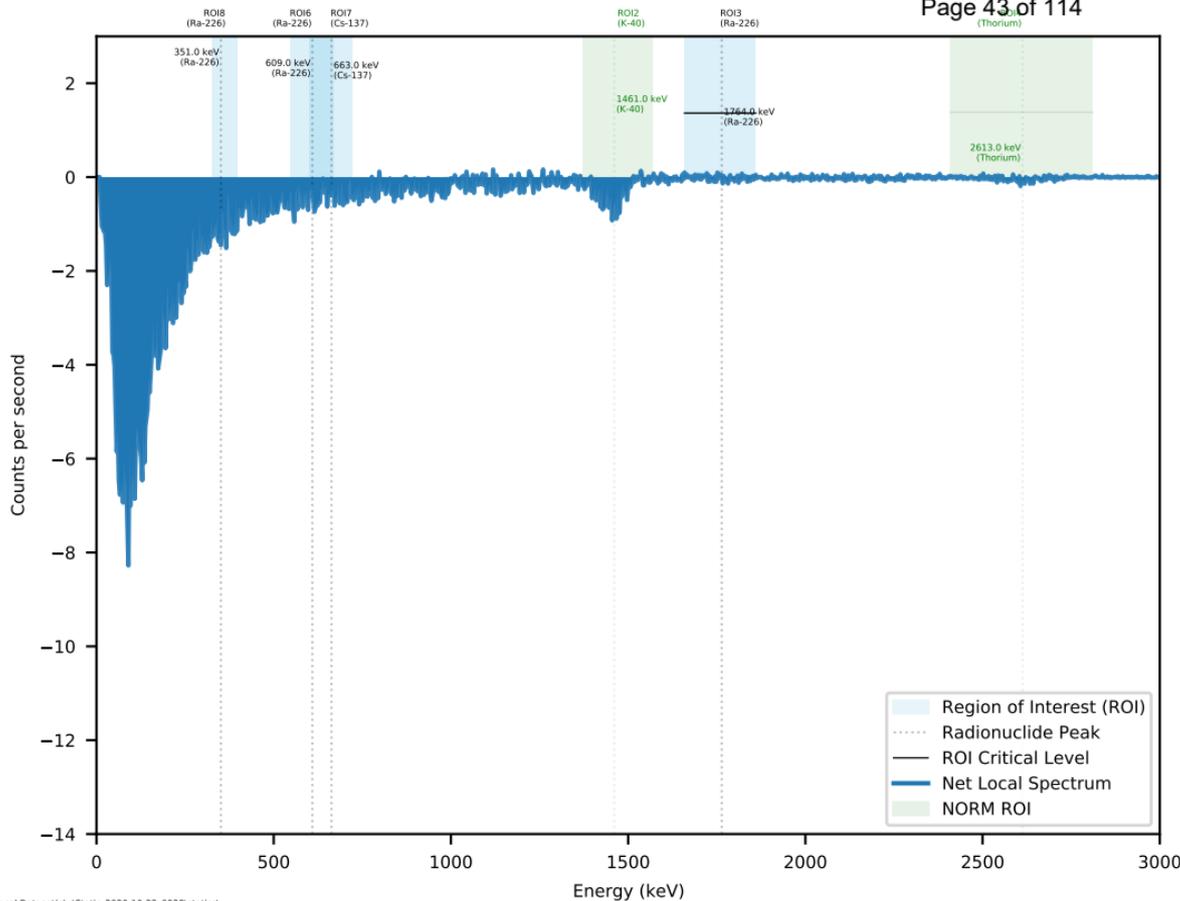


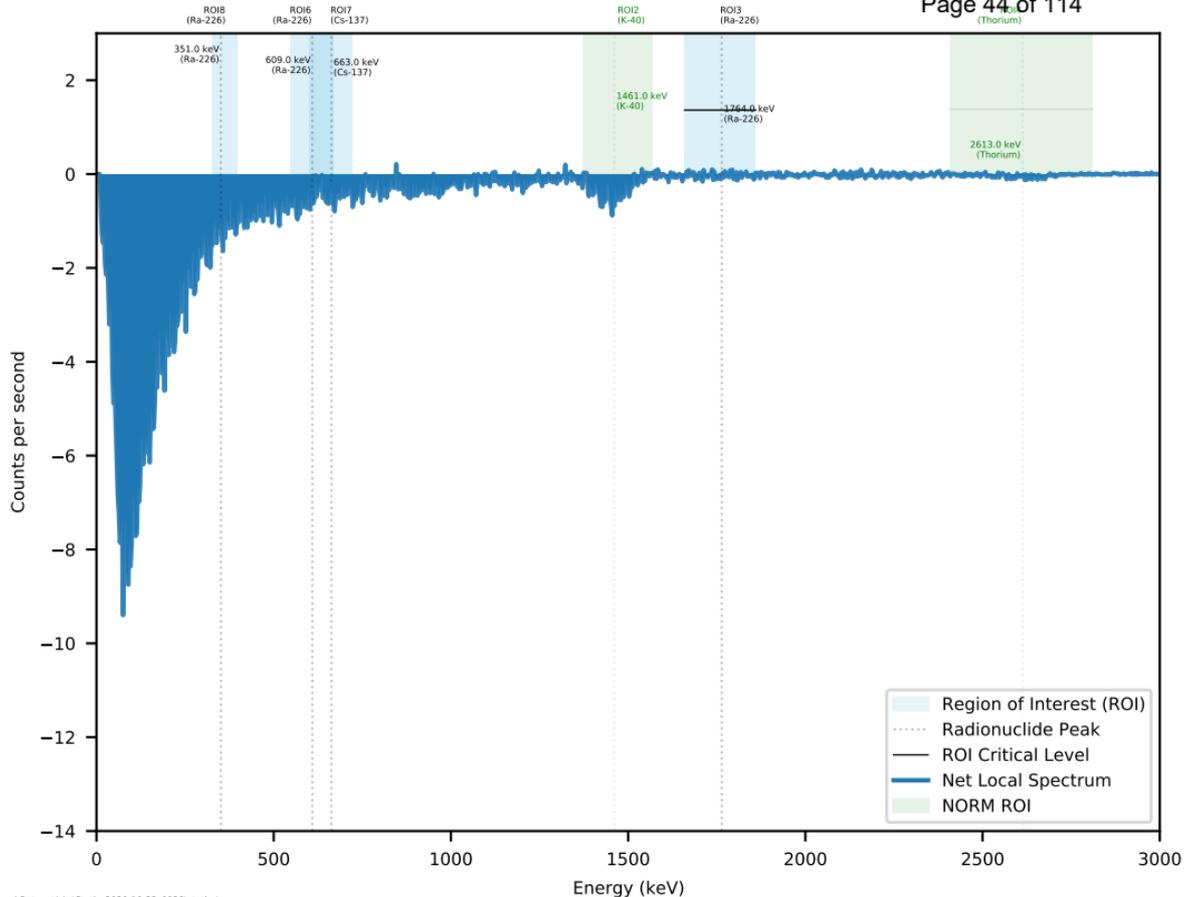


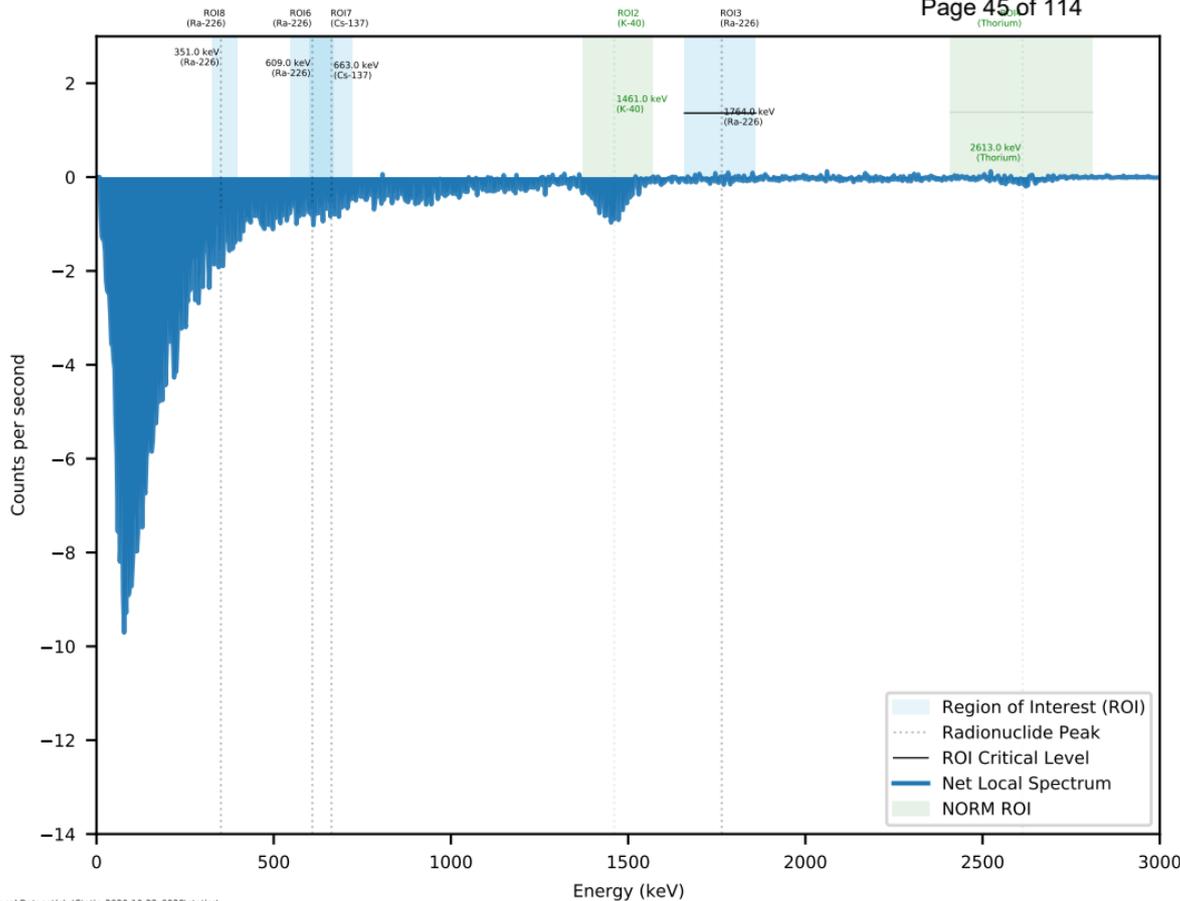


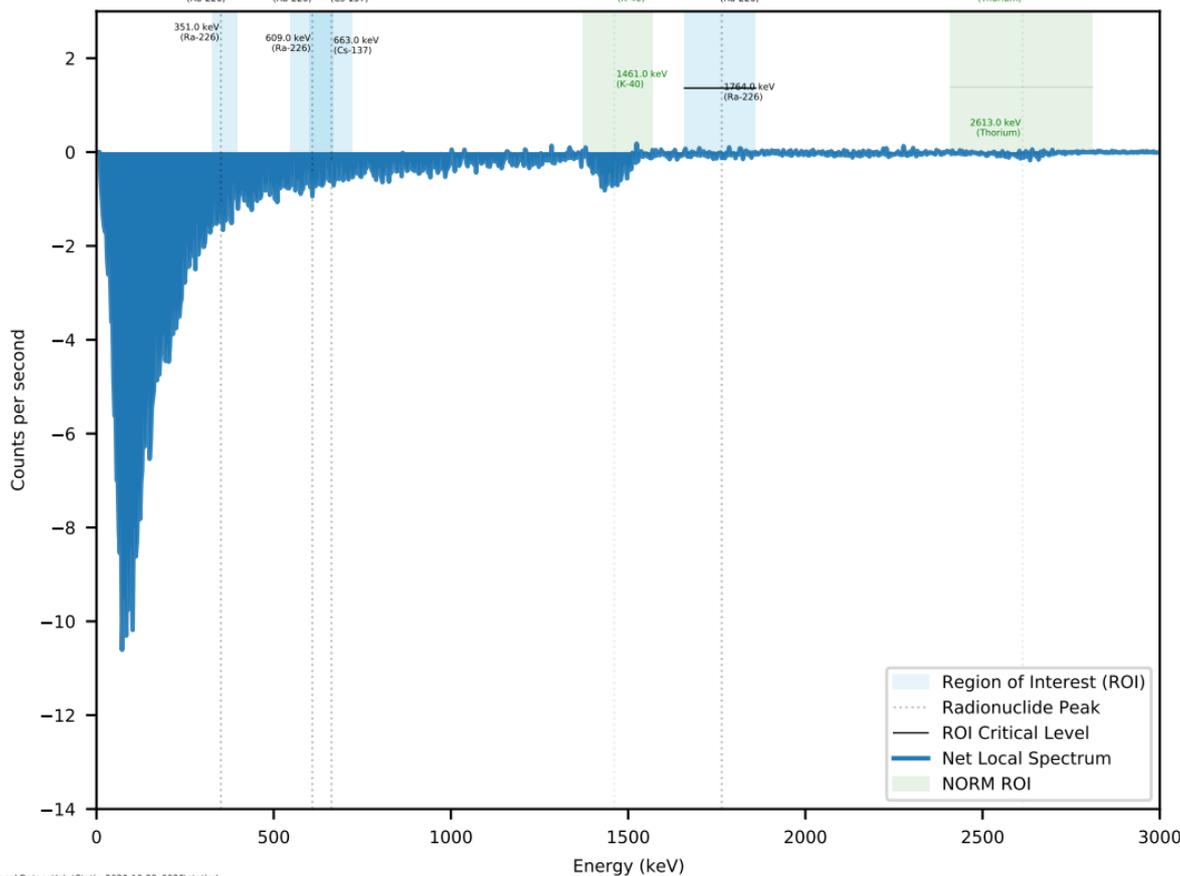


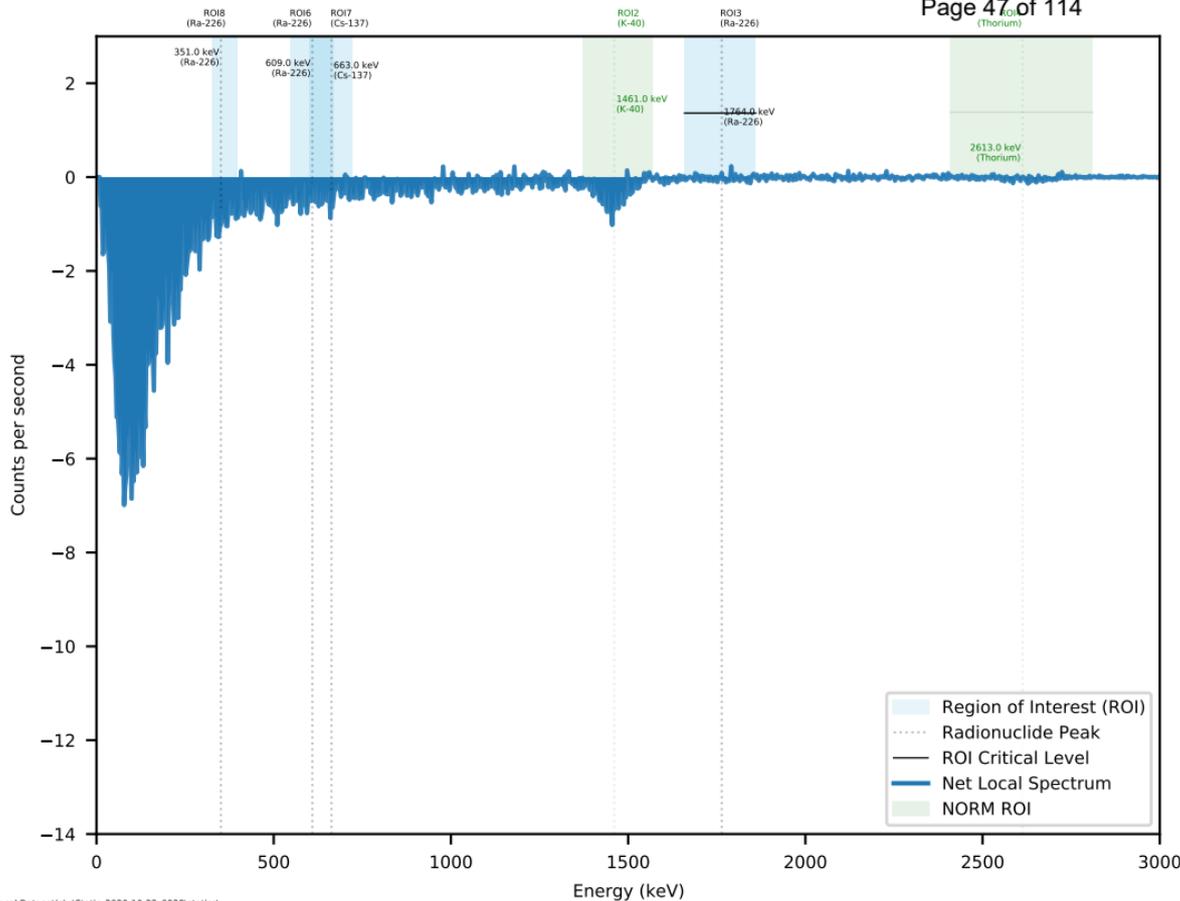


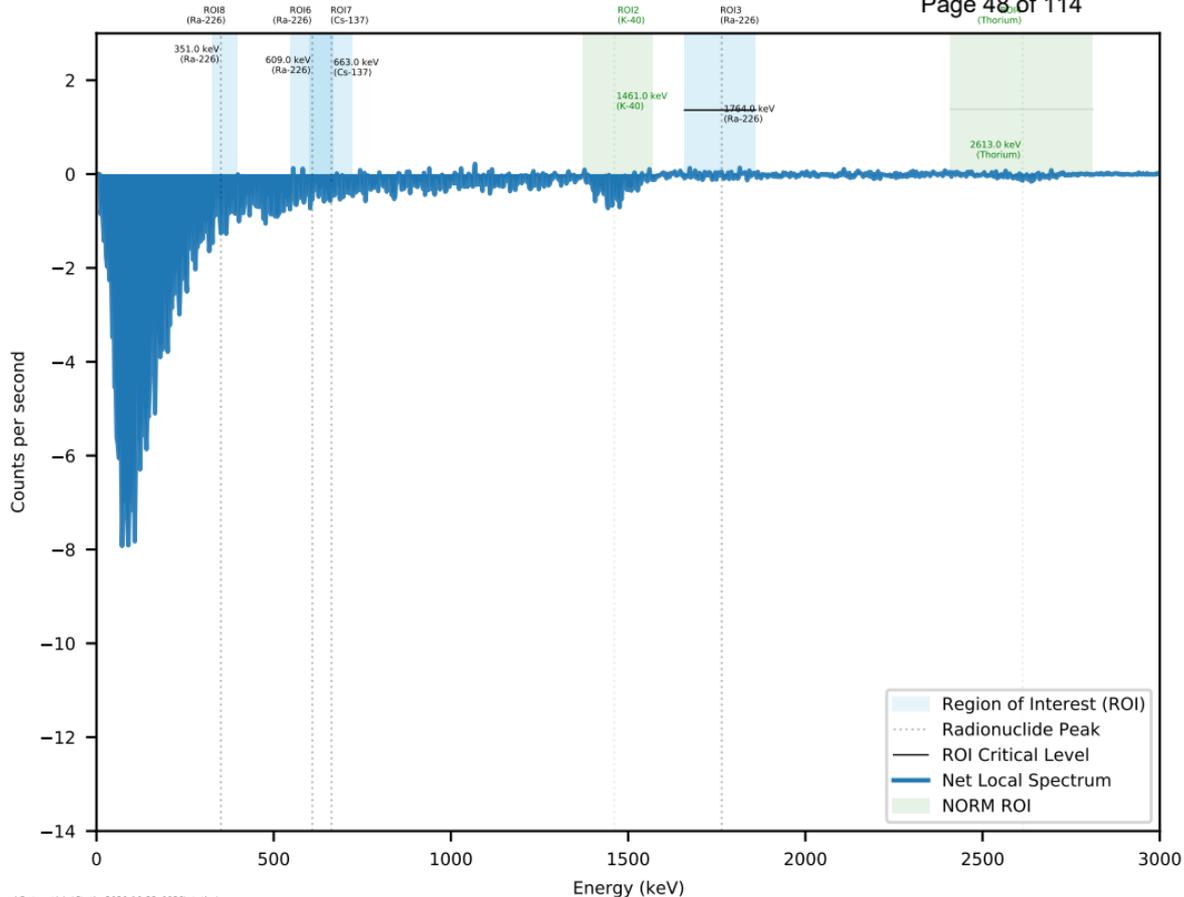


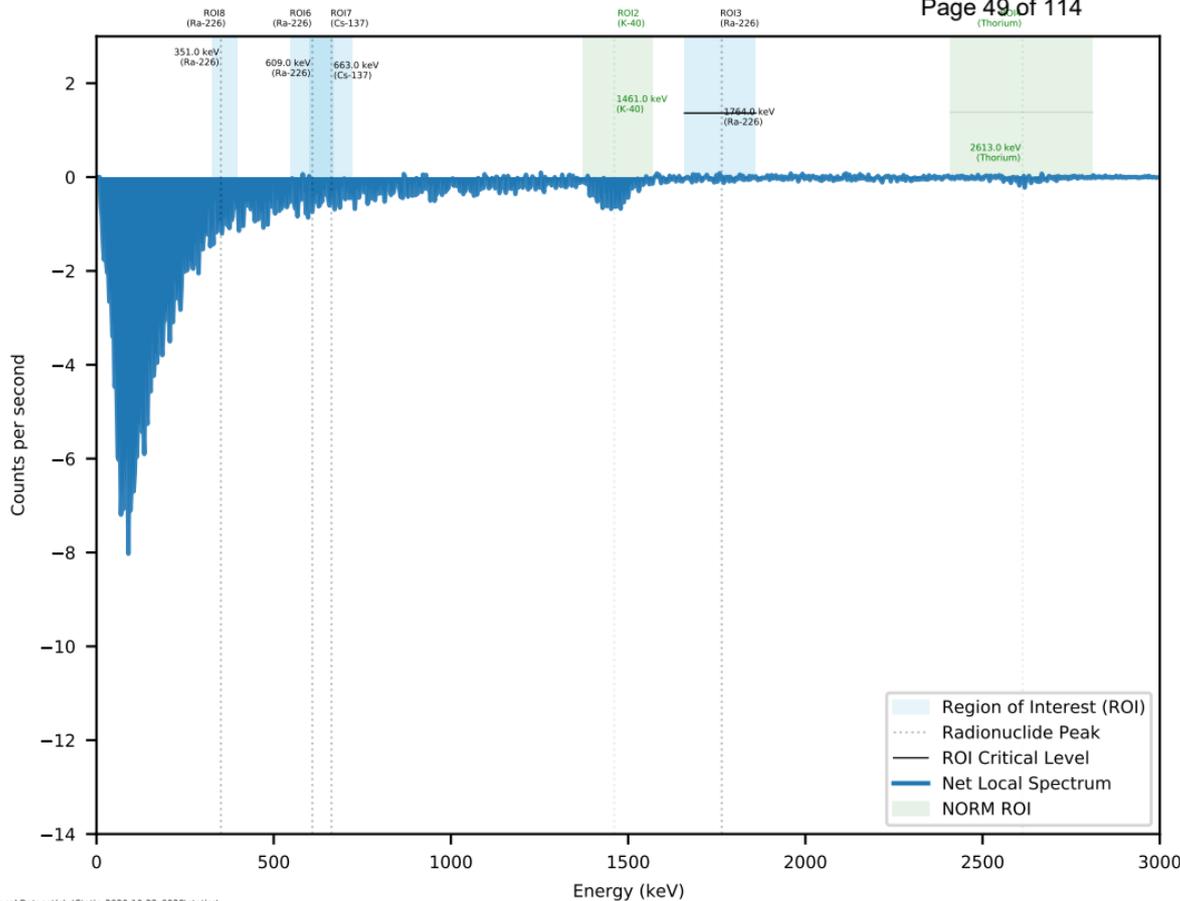


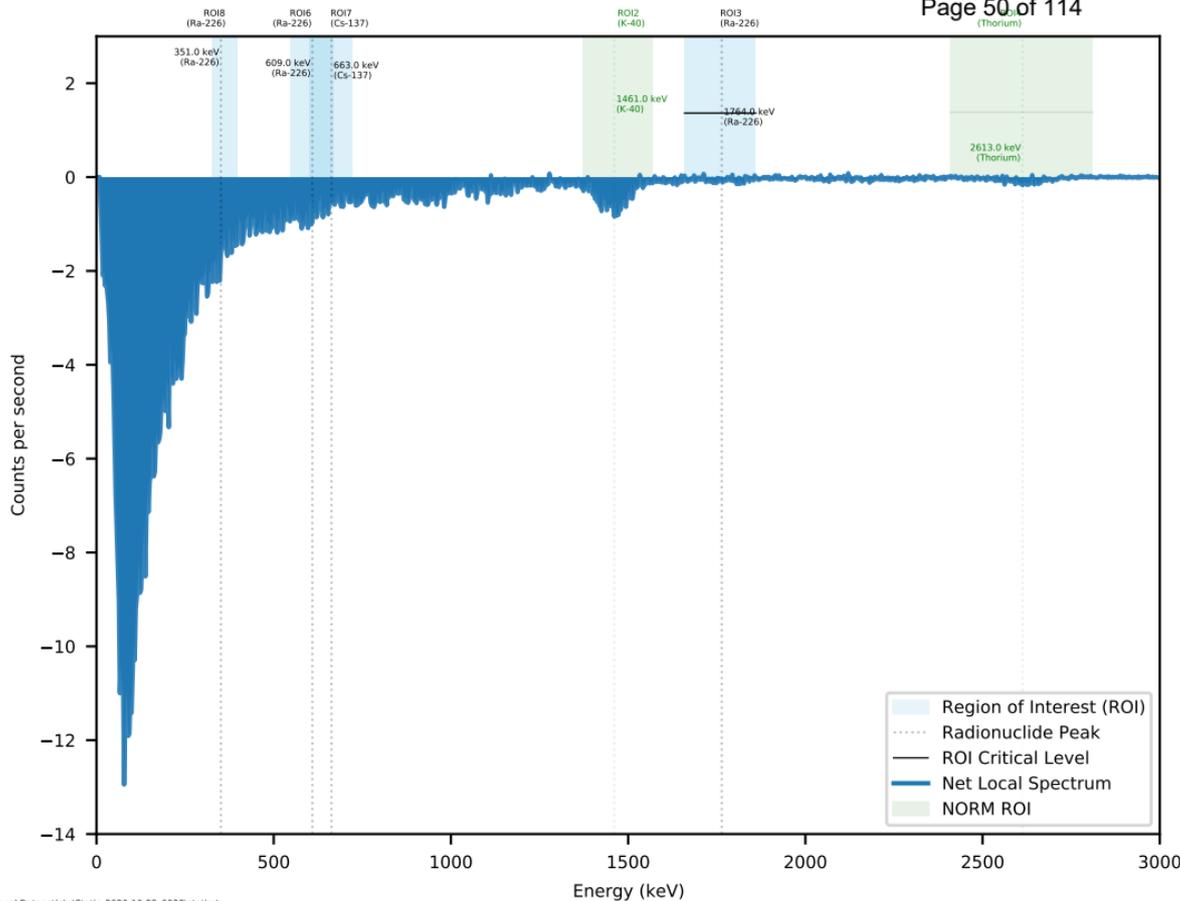


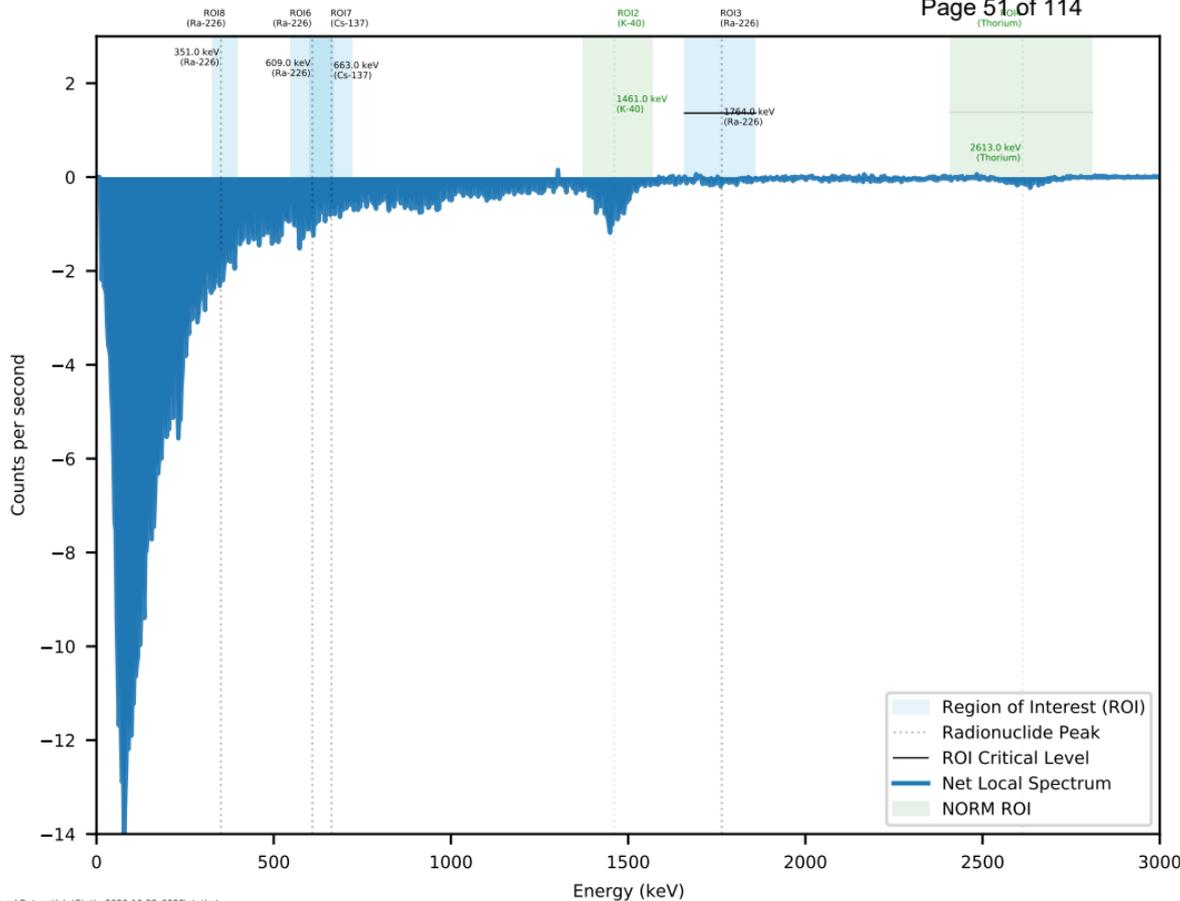


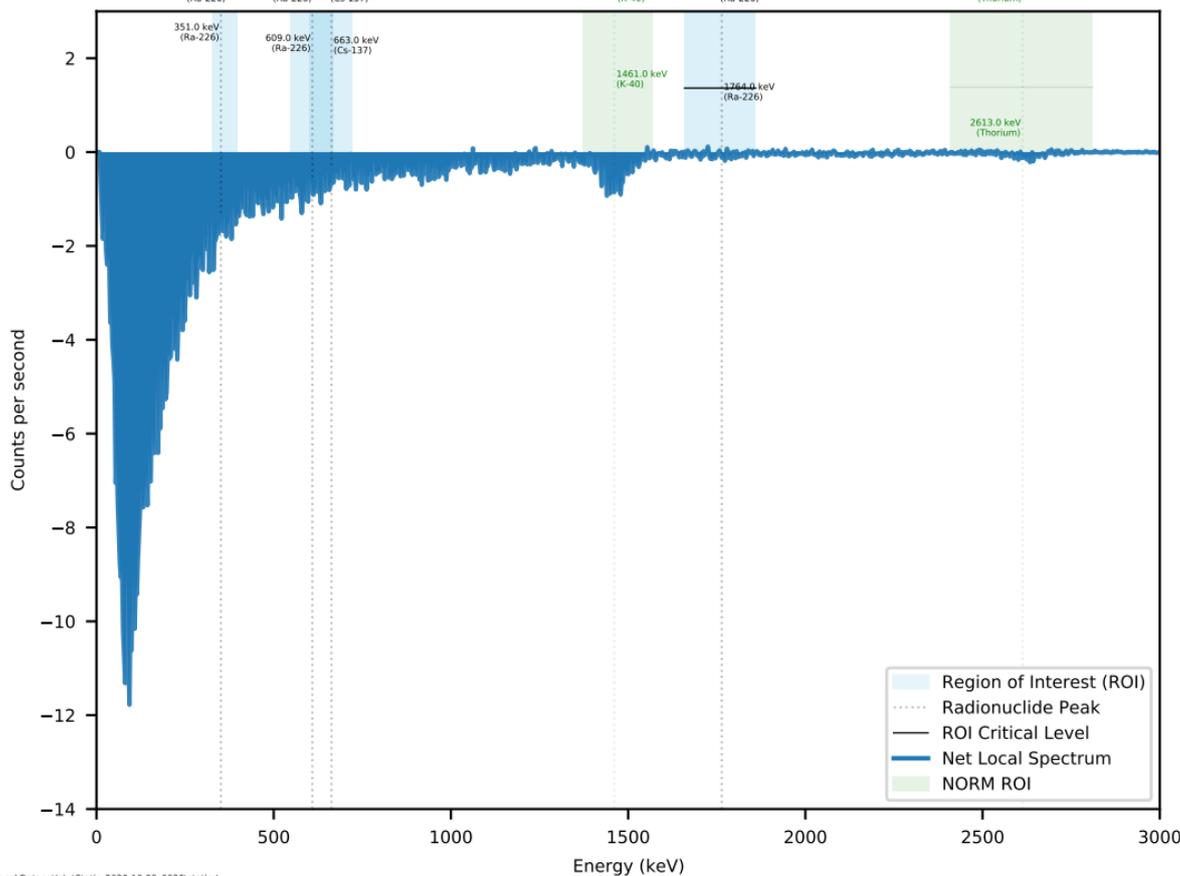


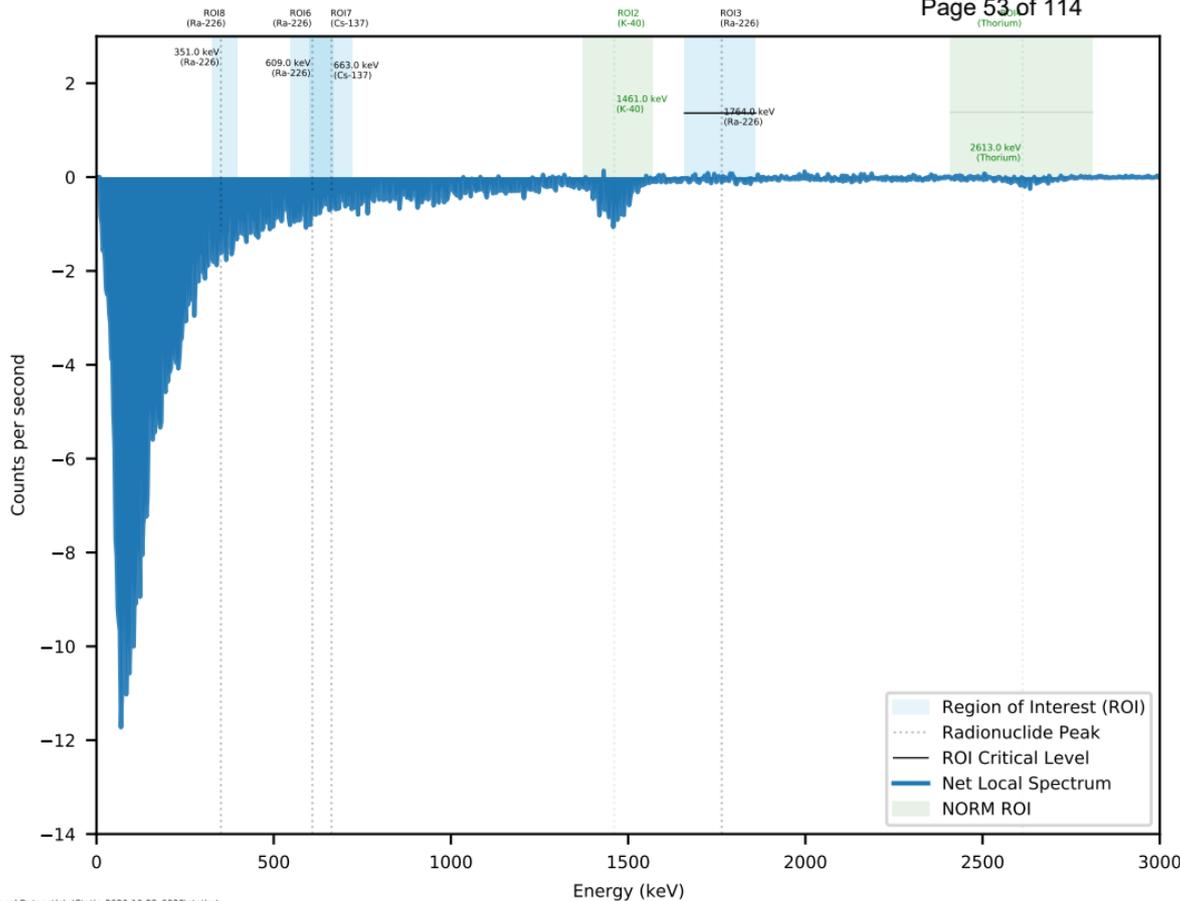


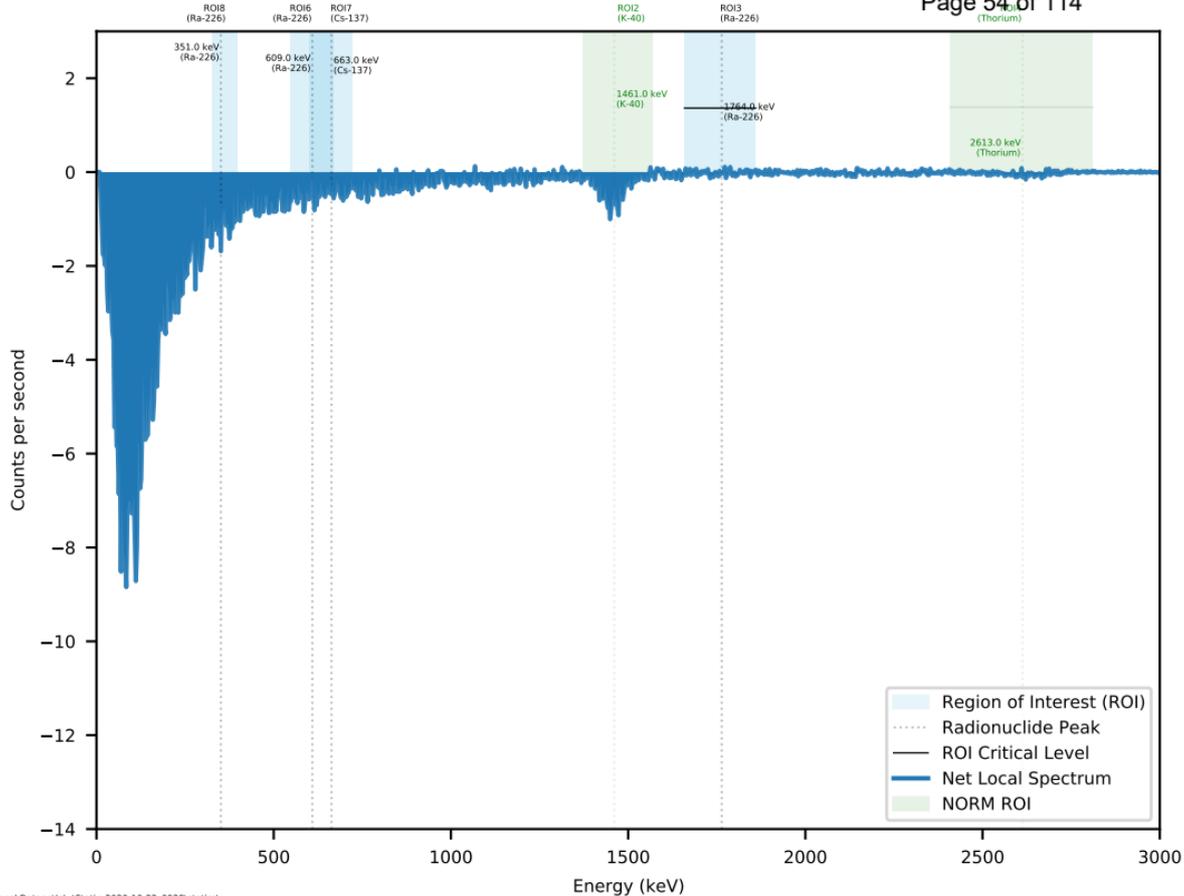


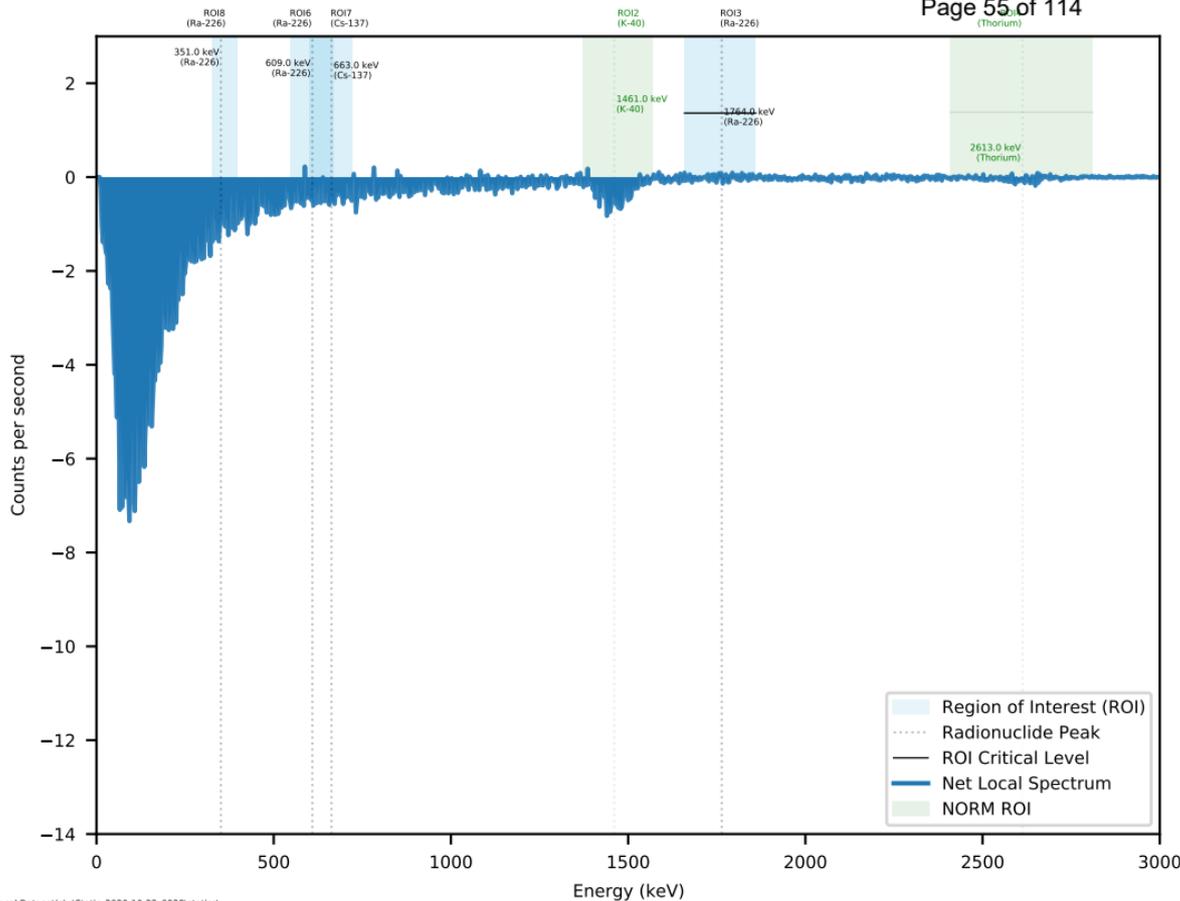


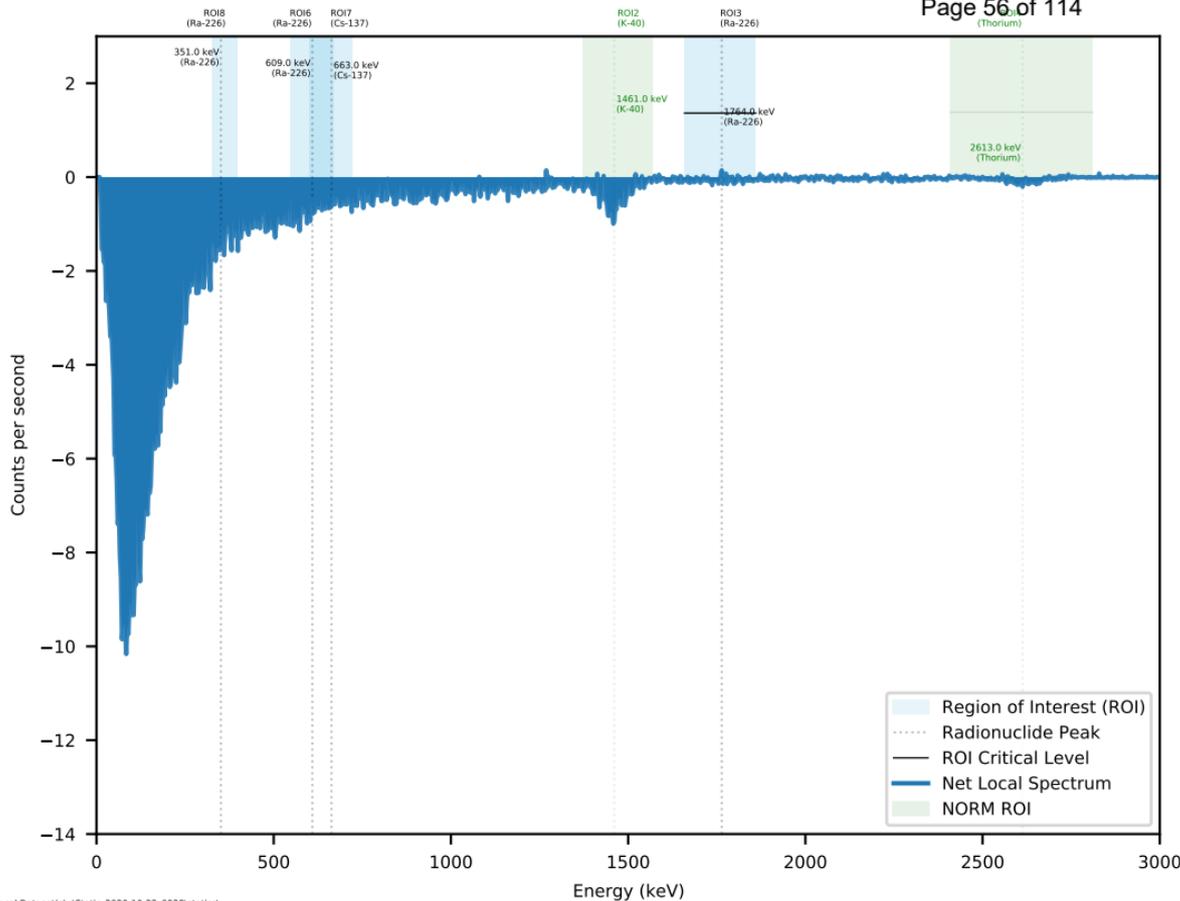


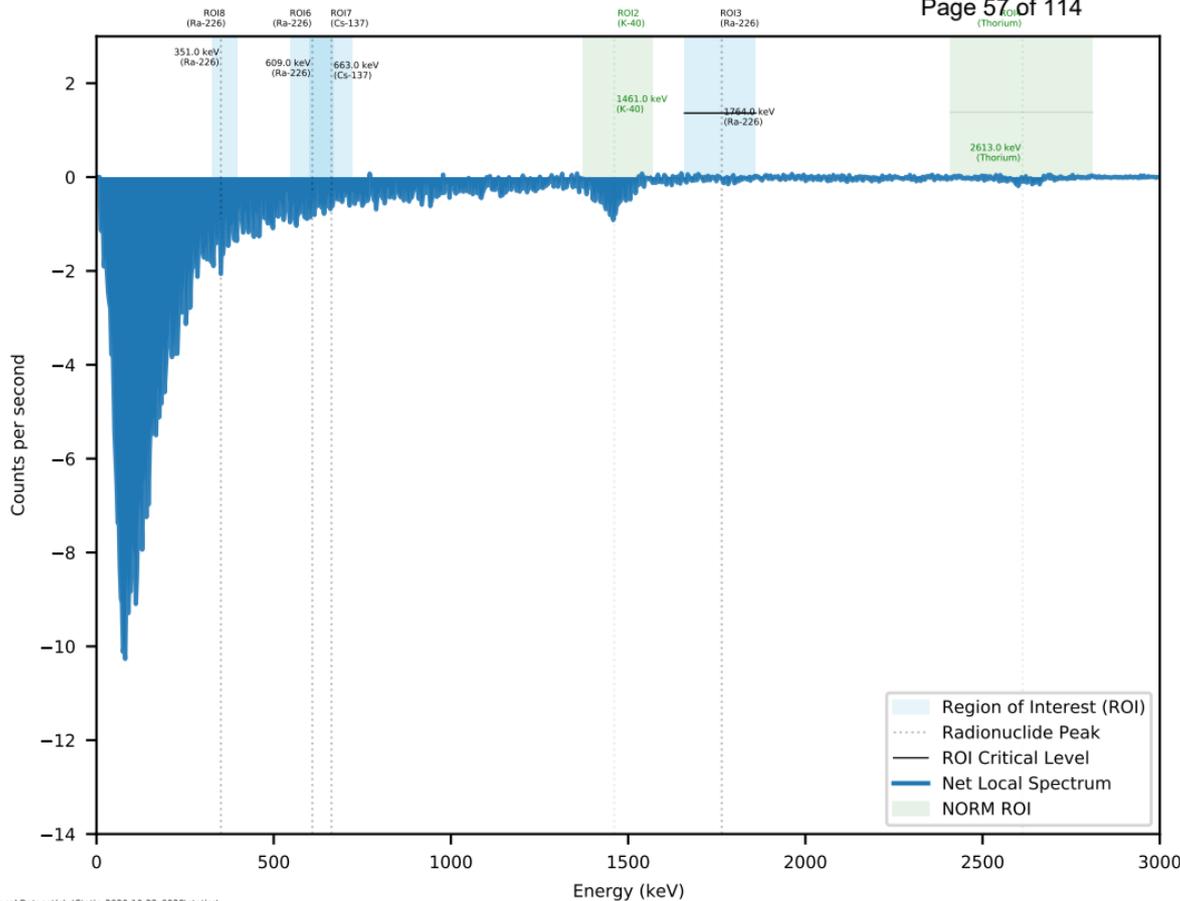












ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40091-1
Laboratory Sample Delivery Group: GJ46599780
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/13/2021 2:20:42 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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results through
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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	7
Receipt Checklists	11
Definitions/Glossary	12
Method Summary	13
Sample Summary	14
Client Sample Results	15
QC Sample Results	31
QC Association Summary	37
Tracer Carrier Summary	40

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Job ID: 160-40091-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40091-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Job ID: 160-40091-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.3 C.

TOTAL BETA STRONTIUM (GFPC)

Samples HPPG-317364365-SU28A-001 (160-40091-1), HPPG-317364365-SU28A-011 (160-40091-11) and HPPG-317364365-SU28A-021 (160-40091-21) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/27/2020, prepared on 11/06/2020 and analyzed on 11/26/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP: HPPG-317364365-SU28A-001 (160-40091-1), HPPG-317364365-SU28A-011 (160-40091-11) and HPPG-317364365-SU28A-021 (160-40091-21).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Samples HPPG-317364365-SU28A-001 (160-40091-1), HPPG-317364365-SU28A-011 (160-40091-11) and HPPG-317364365-SU28A-021 (160-40091-21) were analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/27/2020, prepared on 12/15/2020 and analyzed on 12/23/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-491927/1-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Samples HPPG-317364365-SU28A-001 (160-40091-1), HPPG-317364365-SU28A-011 (160-40091-11) and HPPG-317364365-SU28A-021 (160-40091-21) were analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/27/2020, prepared on 11/03/2020 and analyzed on 12/03/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-487802/1-A)

Detectors 163-170 were calibrated on 11/6 therefore no monthly calibration verification (ccv) is needed until the the following monthly check which was 12/14 for these detectors.(LCS 160-487802/2-A), (MB 160-487802/1-A), (160-40090-A-1-E) and (160-40090-A-1-F DU)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples HPPG-317364365-SU28A-001 (160-40091-1), HPPG-317364365-SU28A-002 (160-40091-2), HPPG-317364365-SU28A-003 (160-40091-3), HPPG-317364365-SU28A-004 (160-40091-4), HPPG-317364365-SU28A-005 (160-40091-5), HPPG-317364365-SU28A-006 (160-40091-6), HPPG-317364365-SU28A-007 (160-40091-7), HPPG-317364365-SU28A-008 (160-40091-8), HPPG-317364365-SU28A-009 (160-40091-9), HPPG-317364365-SU28A-010 (160-40091-10), HPPG-317364365-SU28A-011 (160-40091-11), HPPG-317364365-SU28A-012 (160-40091-12), HPPG-317364365-SU28A-013 (160-40091-13), HPPG-317364365-SU28A-014 (160-40091-14), HPPG-317364365-SU28A-015 (160-40091-15), HPPG-317364365-SU28A-016 (160-40091-16), HPPG-317364365-SU28A-017 (160-40091-17), HPPG-317364365-SU28A-018 (160-40091-18), HPPG-317364365-SU28A-019 (160-40091-19), HPPG-317364365-SU28A-020 (160-40091-20), HPPG-317364365-SU28A-021 (160-40091-21), HPPG-317364365-SU28A-022 (160-40091-22), HPPG-317364365-SU28A-023 (160-40091-23), HPPG-317364365-SU28A-024 (160-40091-24), HPPG-317364365-SU28A-025 (160-40091-25), HPPG-F-015 (160-40091-26) and HPPG-F-016 (160-40091-27) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/27/2020 and 10/28/2020, prepared on 11/02/2020, 11/03/2020 and 11/04/2020 and analyzed on 11/25/2020, 11/26/2020 and 12/01/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often,

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Job ID: 160-40091-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-216
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

Gamma prep batch 488229

The radium-226 detection goal of 0.2 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

The radium-226 activity in the sample is below to the DLC and RL. (MB 160-488229/1-A)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: (160-40093-A-15-C DU). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

The method blank (MB) z-score associated with Prep Batch 160-488229 is within limits and is stored in the level IV raw data. (MB 160-488229/1-A)

Gamma prep batch 487748

The method blank (MB) z-score associated with Prep Batch 160-487748 is within limits and is stored in the level IV raw data. (MB 160-487748/1-A)

The replicate precision for Pb-214 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40092-A-11-C DU)

Gamma prep batch 487736

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

HPPG-317364365-SU28A-006 (160-40091-6) and HPPG-317364365-SU28A-009 (160-40091-9)

The method blank (MB) z-score associated with Prep Batch 160-487736 is within limits and is stored in the level IV raw data. (MB 160-487736/1-A)

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU for Th-234: HPPG-317364365-SU28A-011

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Job ID: 160-40091-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

(160-40091-11). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

Gamma prep batch -488132

The method blank (MB) z-score associated with Prep Batch 160-488132 is within limits and is stored in the level IV raw data. (MB 160-488132/1-A)

The replicate precision for Co-60 associated with Prep Batch 160-487040 and 160-488132 does not meet QC criteria. This appears to be random in nature, and limited deviations such as this are statistically expected when larger analyte lists are reported. Such excursions are often caused by fluctuations in Compton background, force-fitting of peaks that are not found by the software peak-search algorithm, and inclusion of inferior peak results by the software in weighted averages. The laboratory SOP allows for such statistical exceedances. (160-40091-A-23-C DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri

CHAIN OF CUSTODY

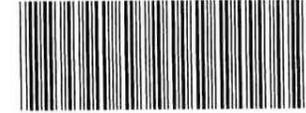
Ref. Document # 501197RSY-013

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/23/2020
Waybill Number: 4957 0225 4373
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Analysis Requested

Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Re-226 by Alpha spec, Isotopic U (234, 235/6, 238)	Isotopic Pu (238, 239/240)
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	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>



160-40091 Chain of Custody

Sample ID	Collection Information			Matrix	# of Containers	Container Type	X	X	X	X	Dose Rate uR/Hr	Evidence Bag ID	Comment
	Date	Time	Method										
	Preservatives (water)	Preservatives (soil)	Container Type										
HPPG-317364365-SU28A-001	10/21/2020	14:54	G	SO	1	16 oz. plastic jar	X	X	X	X		GJ46599780	
HPPG-317364365-SU28A-002	10/21/2020	14:58	G	SO	1	16 oz. plastic jar	X					GJ46599780	
HPPG-317364365-SU28A-003	10/21/2020	15:02	G	SO	1	16 oz. plastic jar	X					GJ46599780	
HPPG-317364365-SU28A-004	10/21/2020	15:06	G	SO	1	16 oz. plastic jar	X					GJ46599780	
HPPG-317364365-SU28A-005	10/21/2020	15:09	G	SO	1	16 oz. plastic jar	X					GJ46599780	
HPPG-317364365-SU28A-006	10/21/2020	15:13	G	SO	1	16 oz. plastic jar	X					GJ46599780	
HPPG-317364365-SU28A-007	10/21/2020	15:17	G	SO	1	16 oz. plastic jar	X					GJ46599780	
HPPG-317364365-SU28A-008	10/21/2020	15:22	G	SO	1	16 oz. plastic jar	X					GJ46599780	

Special Instructions: Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other

Level of QC Required: I II III Project Specific

Method Codes C = Composite G = Grab **Matrix Codes:** DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; VWW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Devin Lewis		10/22/2020 17:43	Locked Storage (RKillpack)		10/22/2020 17:43
Locked Storage (RKillpack)		10/23/2020 17:12	Devin Lewis		10/23/2020 17:12
Devin Lewis		10/23/2020 17:15	SHIPPED TO LAB via FE		10/26/2020 08:38

*** Last 3 transfers shown above - Complete list of transfers on last page ***





CHAIN OF CUSTODY

Ref. Document # 501197RSY-013

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri
Paul LeBlanc

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/23/2020
Waybill Number: 4957 0225 4373
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Analysis Requested						Evidence Bag ID	Comment	
	Date	Time	Method			Container Type	Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Ra-226 by Alpha spec, isotopic U(234, 235/6, 238)	Isotopic Pu (238, 239/240)	Dose Rate uR/Hr			
	Preservatives (water)	Preservatives (soil)												
HPPG-317364365-SU28A-009	10/21/2020	15:31	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-010	10/21/2020	15:36	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-011	10/21/2020	15:40	G	SO	1	16 oz. plastic jar	X	X	X		X		GJ46599780	
HPPG-317364365-SU28A-012	10/21/2020	15:45	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-013	10/21/2020	15:50	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-014	10/21/2020	15:54	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-015	10/21/2020	15:58	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-016	10/21/2020	16:01	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-017	10/21/2020	16:06	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-018	10/21/2020	16:08	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-019	10/21/2020	16:10	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-020	10/21/2020	16:12	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-021	10/21/2020	16:14	G	SO	1	16 oz. plastic jar	X		X	X		X	GJ46599780	
HPPG-317364365-SU28A-022	10/21/2020	16:16	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-023	10/21/2020	16:19	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-024	10/21/2020	16:22	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-317364365-SU28A-025	10/21/2020	16:25	G	SO	1	16 oz. plastic jar	X						GJ46599780	





CHAIN OF CUSTODY

Ref. Document # 501197RSY-013

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy
City: Concord, CA 94520

Sample Lead: Lewis, Devin

Sample Tech(s): Andrew Murri
Paul LeBlanc

Project Number: 501197
Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action
Project Location: San Francisco, CA
Purchase Order #: 1159058
Shipment/Pickup Date: 10/23/2020
Waybill Number: 4957 0225 4373
Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph # Rhoeda Ridenbower (314)298-8566

Sample ID	Collection Information			Matrix	# of Containers	Container Type	Analysis Requested						Evidence Bag ID	Comment
	Date	Time	Method				Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Ra-226 by Alpha spec, Isotopic U(234, 235/6, 238)	Isotopic Pu (238, 239/240)	Dose Rate uR/Hr			
HPPG-F-015	10/21/2020	15:22	G	SO	1	16 oz. plastic jar	X						GJ46599780	
HPPG-F-016	10/21/2020	16:08	G	SO	1	16 oz. plastic jar	X						GJ46599780	



All Transfers for COC 501197RSY-013

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin		10/21/2020 17:26	Locked Storage (RKillpack)		10/21/2020 17:26
Locked Storage (RKillpack)		10/22/2020 15:42	Devin Lewis		10/22/2020 15:42
Devin Lewis		10/22/2020 17:43	Locked Storage (RKillpack)		10/22/2020 17:43
Locked Storage (RKillpack)		10/23/2020 17:12	Devin Lewis		10/23/2020 17:12
Devin Lewis		10/23/2020 17:15	VIA FE SHIPPEDTOLAB	Michael Kennington	10/26/2020 08:30



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40091-1
SDG Number: GJ46599780

Login Number: 40091
List Number: 1
Creator: Korrinhizer, Micha L

List Source: Eurofins TestAmerica, St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40091-1	HPPG-317364365-SU28A-001	Solid	10/21/20 14:54	10/26/20 08:38	
160-40091-2	HPPG-317364365-SU28A-002	Solid	10/21/20 14:58	10/26/20 08:38	
160-40091-3	HPPG-317364365-SU28A-003	Solid	10/21/20 15:02	10/26/20 08:38	
160-40091-4	HPPG-317364365-SU28A-004	Solid	10/21/20 15:06	10/26/20 08:38	
160-40091-5	HPPG-317364365-SU28A-005	Solid	10/21/20 15:09	10/26/20 08:38	
160-40091-6	HPPG-317364365-SU28A-006	Solid	10/21/20 15:13	10/26/20 08:38	
160-40091-7	HPPG-317364365-SU28A-007	Solid	10/21/20 15:17	10/26/20 08:38	
160-40091-8	HPPG-317364365-SU28A-008	Solid	10/21/20 15:22	10/26/20 08:38	
160-40091-9	HPPG-317364365-SU28A-009	Solid	10/21/20 15:31	10/26/20 08:38	
160-40091-10	HPPG-317364365-SU28A-010	Solid	10/21/20 15:36	10/26/20 08:38	
160-40091-11	HPPG-317364365-SU28A-011	Solid	10/21/20 15:40	10/26/20 08:38	
160-40091-12	HPPG-317364365-SU28A-012	Solid	10/21/20 15:45	10/26/20 08:38	
160-40091-13	HPPG-317364365-SU28A-013	Solid	10/21/20 15:50	10/26/20 08:38	
160-40091-14	HPPG-317364365-SU28A-014	Solid	10/21/20 15:54	10/26/20 08:38	
160-40091-15	HPPG-317364365-SU28A-015	Solid	10/21/20 15:58	10/26/20 08:38	
160-40091-16	HPPG-317364365-SU28A-016	Solid	10/21/20 16:01	10/26/20 08:38	
160-40091-17	HPPG-317364365-SU28A-017	Solid	10/21/20 16:06	10/26/20 08:38	
160-40091-18	HPPG-317364365-SU28A-018	Solid	10/21/20 16:08	10/26/20 08:38	
160-40091-19	HPPG-317364365-SU28A-019	Solid	10/21/20 16:10	10/26/20 08:38	
160-40091-20	HPPG-317364365-SU28A-020	Solid	10/21/20 16:12	10/26/20 08:38	
160-40091-21	HPPG-317364365-SU28A-021	Solid	10/21/20 16:14	10/26/20 08:38	
160-40091-22	HPPG-317364365-SU28A-022	Solid	10/21/20 16:16	10/26/20 08:38	
160-40091-23	HPPG-317364365-SU28A-023	Solid	10/21/20 16:19	10/26/20 08:38	
160-40091-24	HPPG-317364365-SU28A-024	Solid	10/21/20 16:22	10/26/20 08:38	
160-40091-25	HPPG-317364365-SU28A-025	Solid	10/21/20 16:25	10/26/20 08:38	
160-40091-26	HPPG-F-015	Solid	10/21/20 15:22	10/26/20 08:38	
160-40091-27	HPPG-F-016	Solid	10/21/20 16:08	10/26/20 08:38	

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-001

Lab Sample ID: 160-40091-1

Date Collected: 10/21/20 14:54

Matrix: Solid

Date Received: 10/26/20 08:38

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0443	U	0.0702	0.0703	0.160	0.0542	pCi/g	11/06/20 11:01	11/26/20 10:44	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	82.7		40 - 110					11/06/20 11:01	11/26/20 10:44	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	0.000	U	0.00844	0.00844	0.100	0.00695	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	0.000	U	0.00845	0.00845	0.100	0.00695	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	92.6		30 - 110					12/15/20 12:11	12/23/20 14:28	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	0.376		0.0571	0.0652	0.250	0.00505	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0270		0.0187	0.0189	0.100	0.00628	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-238	0.392		0.0583	0.0670	0.250	0.00504	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	82.0		30 - 110					11/03/20 12:03	12/03/20 16:16	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	-0.362	U	0.703	0.704		0.406	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Actinium 228	0.280		0.145	0.148		0.135	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Bismuth-212	0.000	U	0.399	0.399		0.591	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Bismuth-214	0.336		0.106	0.111		0.0456	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Cesium-137	-0.000467	U	0.0745	0.0745	0.0700	0.0613	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Lead-210	0.590	U	1.31	1.32		1.05	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Lead-212	0.439		0.0888	0.105		0.0405	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Lead-214	0.477		0.104	0.115		0.0481	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Potassium-40	9.29		1.39	1.68		0.313	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Protactinium-231	0.000	U	0.377	0.377		2.16	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Protactinium-234	0.0880	U	0.182	0.183		0.170	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Radium-226	0.336		0.106	0.111	0.200	0.0456	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Radium-228	0.280		0.145	0.148		0.135	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Thallium-208	0.168		0.0492	0.0523		0.0140	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Thorium-232	0.280		0.145	0.148		0.135	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Thorium-234	-0.0189	U	0.508	0.508		1.05	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Thorium 228	0.439		0.0888	0.105		0.0405	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Uranium-235	0.175	U	0.368	0.368		0.343	pCi/g	11/02/20 15:15	11/26/20 13:52	1
Uranium-238	-0.0189	U	0.508	0.508		1.05	pCi/g	11/02/20 15:15	11/26/20 13:52	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-002

Lab Sample ID: 160-40091-2

Date Collected: 10/21/20 14:58

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.228	U	0.752	0.753		0.460	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Actinium 228	0.0440	U	0.357	0.357		0.187	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Bismuth-212	-0.319	U	0.845	0.846		0.666	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Bismuth-214	0.439		0.123	0.131		0.0507	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Cesium-137	-0.0459	U	0.0803	0.0804	0.0700	0.0623	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Lead-210	1.18		1.54	1.55		1.06	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Lead-212	0.387		0.0957	0.104		0.0490	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Lead-214	0.479		0.136	0.145		0.0597	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Potassium-40	9.26		1.45	1.73		0.132	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Protactinium-231	0.565	U	1.79	1.79		1.97	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Protactinium-234	-0.108	U	0.325	0.325		0.264	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Radium-226	0.439		0.123	0.131	0.200	0.0507	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Radium-228	0.0440	U	0.357	0.357		0.187	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Thallium-208	0.129		0.0859	0.0869		0.0395	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Thorium-232	0.0440	U	0.357	0.357		0.187	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Thorium-234	0.593		0.595	0.599		0.474	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Thorium 228	0.387		0.0957	0.104		0.0490	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Uranium-235	0.00470	U	0.00956	0.00957		0.517	pCi/g	11/02/20 15:15	11/26/20 13:54	1
Uranium-238	0.593		0.595	0.599		0.474	pCi/g	11/02/20 15:15	11/26/20 13:54	1

Client Sample ID: HPPG-317364365-SU28A-003

Lab Sample ID: 160-40091-3

Date Collected: 10/21/20 15:02

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0808	U	0.292	0.292		0.314	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Actinium 228	0.271		0.194	0.196		0.0875	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Bismuth-212	0.306	U	0.483	0.484		0.364	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Bismuth-214	0.179		0.0732	0.0755		0.114	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Cesium-137	0.0244	U	0.0416	0.0417	0.0700	0.0317	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Lead-210	0.0363	U	1.25	1.25		1.02	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Lead-212	0.383		0.0741	0.0892		0.0344	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Lead-214	0.345		0.0900	0.0969		0.0371	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Potassium-40	8.72		1.16	1.46		0.0892	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Protactinium-231	0.626	U	1.50	1.50		1.67	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Protactinium-234	0.0778	U	0.180	0.181		0.152	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Radium-226	0.179		0.0732	0.0755	0.200	0.114	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Radium-228	0.271		0.194	0.196		0.0875	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Thallium-208	0.136		0.0779	0.0792		0.0338	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Thorium-232	0.271		0.194	0.196		0.0875	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Thorium-234	0.000	U	0.299	0.299		0.808	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Thorium 228	0.383		0.0741	0.0892		0.0344	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Uranium-235	0.0916	U	0.268	0.268		0.254	pCi/g	11/02/20 15:15	11/26/20 13:56	1
Uranium-238	0.000	U	0.299	0.299		0.808	pCi/g	11/02/20 15:15	11/26/20 13:56	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-004

Lab Sample ID: 160-40091-4

Date Collected: 10/21/20 15:06

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.123	U	0.368	0.368		0.438	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Actinium 228	-0.139	U	0.0989	0.0999		0.254	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Bismuth-212	-0.509	U	1.05	1.05		0.818	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Bismuth-214	0.380		0.162	0.167		0.0630	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Cesium-137	0.00474	U	0.0663	0.0663	0.0700	0.0541	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Lead-210	-0.160	U	1.72	1.72		1.41	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Lead-212	0.436		0.142	0.153		0.0656	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Lead-214	0.267		0.175	0.177		0.127	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Potassium-40	8.02		1.55	1.75		0.175	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Protactinium-231	0.244	U	1.58	1.58		2.44	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Protactinium-234	0.147	U	0.138	0.139		0.291	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Radium-226	0.380		0.162	0.167	0.200	0.0630	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Radium-228	-0.139	U	0.0989	0.0999		0.254	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Thallium-208	0.162		0.117	0.118		0.0608	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Thorium-232	-0.139	U	0.0989	0.0999		0.254	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Thorium-234	-0.155	U	1.13	1.13		0.933	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Thorium 228	0.436		0.142	0.153		0.0656	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Uranium-235	0.102	U	0.252	0.252		0.522	pCi/g	11/02/20 15:15	11/26/20 13:55	1
Uranium-238	-0.155	U	1.13	1.13		0.933	pCi/g	11/02/20 15:15	11/26/20 13:55	1

Client Sample ID: HPPG-317364365-SU28A-005

Lab Sample ID: 160-40091-5

Date Collected: 10/21/20 15:09

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0497	U	0.226	0.226		0.332	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Actinium 228	0.245		0.111	0.113		0.112	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Bismuth-212	-0.257	U	0.819	0.820		0.653	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Bismuth-214	0.357		0.130	0.136		0.0570	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Cesium-137	-0.0284	U	0.0795	0.0795	0.0700	0.0634	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Lead-210	0.705	U	1.21	1.21		0.828	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Lead-212	0.252		0.0735	0.0804		0.0372	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Lead-214	0.275		0.0905	0.0949		0.0492	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Potassium-40	7.20		1.26	1.46		0.303	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Protactinium-231	0.612	U	1.91	1.91		2.08	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Protactinium-234	0.0614	U	0.298	0.298		0.244	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Radium-226	0.357		0.130	0.136	0.200	0.0570	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Radium-228	0.245		0.111	0.113		0.112	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Thallium-208	0.140		0.0636	0.0653		0.0282	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Thorium-232	0.245		0.111	0.113		0.112	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Thorium-234	0.675		0.576	0.581		0.382	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Thorium 228	0.252		0.0735	0.0804		0.0372	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Uranium-235	-0.184	U	0.610	0.610		0.498	pCi/g	11/02/20 15:15	11/26/20 13:57	1
Uranium-238	0.675		0.576	0.581		0.382	pCi/g	11/02/20 15:15	11/26/20 13:57	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-006

Lab Sample ID: 160-40091-6

Date Collected: 10/21/20 15:13

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.224	U	0.434	0.435		0.351	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Actinium 228	0.448		0.205	0.211		0.112	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Bismuth-212	-0.0182	U	1.05	1.05		0.866	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Bismuth-214	0.373		0.150	0.156		0.0567	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Cesium-137	0.0306	U	0.104	0.104	0.0700	0.0833	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Lead-210	1.11	U	2.01	2.01		1.59	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Lead-212	0.343		0.107	0.114		0.0626	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Lead-214	0.490		0.149	0.159		0.0696	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Potassium-40	9.29		1.61	1.93		0.321	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Protactinium-231	-1.09	U	3.58	3.58		2.91	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Protactinium-234	-0.133	U	0.410	0.410		0.334	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Radium-226	0.373		0.150	0.156	0.200	0.0567	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Radium-228	0.448		0.205	0.211		0.112	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Thallium-208	0.105		0.104	0.105		0.0559	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Thorium-232	0.448		0.205	0.211		0.112	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Thorium-234	-0.600	U	1.04	1.04		0.956	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Thorium 228	0.343		0.107	0.114		0.0626	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Uranium-235	0.0451	U	0.0989	0.0990		0.258	pCi/g	11/02/20 15:15	11/26/20 13:58	1
Uranium-238	-0.600	U	1.04	1.04		0.956	pCi/g	11/02/20 15:15	11/26/20 13:58	1

Client Sample ID: HPPG-317364365-SU28A-007

Lab Sample ID: 160-40091-7

Date Collected: 10/21/20 15:17

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.296	U	0.605	0.606		0.358	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Actinium 228	0.378		0.195	0.199		0.281	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Bismuth-212	-0.0131	U	1.10	1.10		0.908	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Bismuth-214	0.666		0.173	0.186		0.0432	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Cesium-137	0.0361	U	0.0790	0.0791	0.0700	0.0604	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Lead-210	1.18	U	2.04	2.05		1.39	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Lead-212	0.592		0.127	0.141		0.0596	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Lead-214	0.521		0.136	0.146		0.0820	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Potassium-40	9.81		1.96	2.20		0.329	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Protactinium-231	0.435	U	1.85	1.85		2.90	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Protactinium-234	0.103	U	0.356	0.356		0.289	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Radium-226	0.666		0.173	0.186	0.200	0.0432	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Radium-228	0.378		0.195	0.199		0.281	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Thallium-208	0.140		0.136	0.136		0.0645	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Thorium-232	0.378		0.195	0.199		0.281	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Thorium-234	1.33		0.838	0.851		0.527	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Thorium 228	0.592		0.127	0.141		0.0596	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Uranium-235	0.0559	U	0.173	0.173		0.508	pCi/g	11/02/20 15:15	11/26/20 14:35	1
Uranium-238	1.33		0.838	0.851		0.527	pCi/g	11/02/20 15:15	11/26/20 14:35	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-008

Lab Sample ID: 160-40091-8

Date Collected: 10/21/20 15:22

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.118	U	0.517	0.517		0.315	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Actinium 228	0.503		0.222	0.228		0.0784	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Bismuth-212	-0.0448	U	0.879	0.879		0.720	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Bismuth-214	0.0994	U	0.201	0.201		0.155	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Cesium-137	0.0189	U	0.0357	0.0357	0.0700	0.0259	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Lead-210	1.25		1.63	1.64		1.08	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Lead-212	0.484		0.105	0.122		0.0511	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Lead-214	0.564		0.156	0.166		0.0648	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Potassium-40	7.96		1.40	1.62		0.339	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Protactinium-231	0.000	U	0.852	0.852		2.33	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Protactinium-234	0.0470	U	0.0687	0.0688		0.211	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Radium-226	0.0994	U	0.201	0.201	0.200	0.155	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Radium-228	0.503		0.222	0.228		0.0784	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Thallium-208	0.140		0.0602	0.0619		0.0281	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Thorium-232	0.503		0.222	0.228		0.0784	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Thorium-234	-0.167	U	0.692	0.692		0.477	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Thorium 228	0.484		0.105	0.122		0.0511	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Uranium-235	0.0728	U	0.0786	0.0790		0.388	pCi/g	11/02/20 15:15	11/26/20 14:39	1
Uranium-238	-0.167	U	0.692	0.692		0.477	pCi/g	11/02/20 15:15	11/26/20 14:39	1

Client Sample ID: HPPG-317364365-SU28A-009

Lab Sample ID: 160-40091-9

Date Collected: 10/21/20 15:31

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.226	U	0.498	0.498		0.291	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Actinium 228	0.191	U	0.318	0.319		0.201	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Bismuth-212	-0.0721	U	1.14	1.14		0.935	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Bismuth-214	0.202		0.141	0.142		0.188	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Cesium-137	-0.0958	U	0.139	0.139	0.0700	0.0962	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Lead-210	0.831	U	1.65	1.66		1.13	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Lead-212	0.491		0.116	0.132		0.0492	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Lead-214	0.369		0.145	0.150		0.0679	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Potassium-40	8.36		1.81	2.00		0.357	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Protactinium-231	0.0000000	U	3.39	3.39		2.79	pCi/g	11/02/20 15:15	11/26/20 14:37	1
	434									
Protactinium-234	0.0527	U	0.0893	0.0895		0.229	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Radium-226	0.202		0.141	0.142	0.200	0.188	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Radium-228	0.191	U	0.318	0.319		0.201	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Thallium-208	0.285		0.0801	0.0854		0.0125	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Thorium-232	0.191	U	0.318	0.319		0.201	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Thorium-234	0.689		0.567	0.572		0.435	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Thorium 228	0.491		0.116	0.132		0.0492	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Uranium-235	0.123	U	0.372	0.372		0.299	pCi/g	11/02/20 15:15	11/26/20 14:37	1
Uranium-238	0.689		0.567	0.572		0.435	pCi/g	11/02/20 15:15	11/26/20 14:37	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-010

Lab Sample ID: 160-40091-10

Date Collected: 10/21/20 15:36

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.290	U	0.563	0.564		0.325	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Actinium 228	0.116	U	0.192	0.192		0.117	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Bismuth-212	0.000	U	0.229	0.229		0.461	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Bismuth-214	0.292		0.0978	0.102		0.0427	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Cesium-137	-0.00897	U	0.0624	0.0624	0.0700	0.0508	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Lead-210	-0.603	U	1.14	1.15		0.911	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Lead-212	0.307		0.0671	0.0780		0.0320	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Lead-214	0.241		0.0835	0.0872		0.0371	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Potassium-40	8.00		1.14	1.40		0.245	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Protactinium-231	0.481	U	1.42	1.43		1.56	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Protactinium-234	0.0166	U	0.197	0.197		0.161	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Radium-226	0.292		0.0978	0.102	0.200	0.0427	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Radium-228	0.116	U	0.192	0.192		0.117	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Thallium-208	0.0807		0.0340	0.0351		0.0122	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Thorium-232	0.116	U	0.192	0.192		0.117	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Thorium-234	0.158	U	0.337	0.338		0.692	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Thorium 228	0.307		0.0671	0.0780		0.0320	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Uranium-235	-0.00694	U	0.0115	0.0115		0.300	pCi/g	11/02/20 15:15	11/26/20 14:40	1
Uranium-238	0.158	U	0.337	0.338		0.692	pCi/g	11/02/20 15:15	11/26/20 14:40	1

Client Sample ID: HPPG-317364365-SU28A-011

Lab Sample ID: 160-40091-11

Date Collected: 10/21/20 15:40

Matrix: Solid

Date Received: 10/26/20 08:38

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	-0.0184	U	0.0547	0.0547	0.160	0.0467	pCi/g	11/06/20 11:01	11/26/20 10:44	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	90.2		40 - 110					11/06/20 11:01	11/26/20 10:44	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-238	-0.00636	U	0.00948	0.00949	0.100	0.00986	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	0.000	U	0.0104	0.0104	0.100	0.00855	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	93.2		30 - 110					12/15/20 12:11	12/23/20 14:28	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-234	0.319		0.0546	0.0608	0.250	0.0103	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0110		0.0135	0.0135	0.100	0.00641	pCi/g	11/03/20 12:03	12/03/20 16:16	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-011

Lab Sample ID: 160-40091-11

Date Collected: 10/21/20 15:40

Matrix: Solid

Date Received: 10/26/20 08:38

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-238	0.367		0.0587	0.0663	0.250	0.0115	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	77.1		30 - 110					11/03/20 12:03	12/03/20 16:16	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.108	U	0.399	0.399		0.363	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Actinium 228	0.270		0.239	0.240		0.126	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Bismuth-212	-0.335	U	0.797	0.798		0.624	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Bismuth-214	0.276		0.115	0.118		0.0556	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Cesium-137	0.000	U	0.0441	0.0441	0.0700	0.0598	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Lead-210	-1.00	U	1.78	1.78		1.51	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Lead-212	0.376		0.0887	0.0970		0.0424	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Lead-214	0.317		0.103	0.108		0.0685	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Potassium-40	9.45		1.43	1.72		0.127	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Protactinium-231	0.000	U	0.842	0.842		2.30	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Protactinium-234	0.0983	U	0.261	0.261		0.219	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Radium-226	0.276		0.115	0.118	0.200	0.0556	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Radium-228	0.270		0.239	0.240		0.126	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Thallium-208	0.134		0.0732	0.0745		0.0337	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Thorium-232	0.270		0.239	0.240		0.126	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Thorium-234	-1.00	U	0.612	0.622		0.924	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Thorium 228	0.376		0.0887	0.0970		0.0424	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Uranium-235	-0.110	U	0.499	0.500		0.408	pCi/g	11/02/20 15:15	11/26/20 14:41	1
Uranium-238	-1.00	U	0.612	0.622		0.924	pCi/g	11/02/20 15:15	11/26/20 14:41	1

Client Sample ID: HPPG-317364365-SU28A-012

Lab Sample ID: 160-40091-12

Date Collected: 10/21/20 15:45

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.0888	U	0.468	0.468		0.274	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Actinium 228	0.444		0.139	0.146		0.0252	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Bismuth-212	-0.467	U	0.721	0.722		0.555	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Bismuth-214	0.235		0.0905	0.0937		0.137	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Cesium-137	0.00289	U	0.0463	0.0463	0.0700	0.0379	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Lead-210	0.203	U	1.40	1.40		1.14	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Lead-212	0.382		0.0782	0.0925		0.0363	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Lead-214	0.465		0.0991	0.110		0.0503	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Potassium-40	8.34		1.19	1.47		0.0996	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Protactinium-231	0.000	U	0.388	0.388		1.87	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Protactinium-234	0.0807	U	0.264	0.264		0.215	pCi/g	11/02/20 15:15	11/26/20 14:42	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-012

Lab Sample ID: 160-40091-12

Date Collected: 10/21/20 15:45

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.235		0.0905	0.0937	0.200	0.137	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Radium-228	0.444		0.139	0.146		0.0252	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Thallium-208	0.228		0.0661	0.0702		0.0202	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Thorium-232	0.444		0.139	0.146		0.0252	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Thorium-234	-0.378	U	1.28	1.28		1.05	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Thorium 228	0.382		0.0782	0.0925		0.0363	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Uranium-235	0.0891	U	0.177	0.177		0.372	pCi/g	11/02/20 15:15	11/26/20 14:42	1
Uranium-238	-0.378	U	1.28	1.28		1.05	pCi/g	11/02/20 15:15	11/26/20 14:42	1

Client Sample ID: HPPG-317364365-SU28A-013

Lab Sample ID: 160-40091-13

Date Collected: 10/21/20 15:50

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0784	U	0.478	0.478		0.295	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Actinium 228	0.0965	U	0.189	0.189		0.129	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Bismuth-212	-0.241	U	0.776	0.776		0.620	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Bismuth-214	0.274		0.0893	0.0937		0.0365	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Cesium-137	0.0207	U	0.0609	0.0610	0.0700	0.0484	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Lead-210	0.922		1.17	1.17		0.762	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Lead-212	0.200		0.0655	0.0704		0.0360	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Lead-214	0.207		0.0813	0.0841		0.0387	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Potassium-40	6.99		1.17	1.37		0.269	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Protactinium-231	0.594	U	1.87	1.87		1.52	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Protactinium-234	0.0116	U	0.0228	0.0228		0.212	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Radium-226	0.274		0.0893	0.0937	0.200	0.0365	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Radium-228	0.0965	U	0.189	0.189		0.129	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Thallium-208	0.0613		0.0620	0.0624		0.0272	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Thorium-232	0.0965	U	0.189	0.189		0.129	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Thorium-234	0.558		0.526	0.529		0.353	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Thorium 228	0.200		0.0655	0.0704		0.0360	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Uranium-235	0.129	U	0.406	0.406		0.330	pCi/g	11/02/20 17:57	11/26/20 10:15	1
Uranium-238	0.558		0.526	0.529		0.353	pCi/g	11/02/20 17:57	11/26/20 10:15	1

Client Sample ID: HPPG-317364365-SU28A-014

Lab Sample ID: 160-40091-14

Date Collected: 10/21/20 15:54

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.129	U	0.285	0.285		0.243	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Actinium 228	0.376		0.208	0.211		0.0777	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Bismuth-212	-0.359	U	0.819	0.820		0.638	pCi/g	11/02/20 17:57	11/26/20 10:59	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-014

Lab Sample ID: 160-40091-14

Date Collected: 10/21/20 15:54

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.390		0.110	0.117		0.0293	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Cesium-137	-0.0442	U	0.0328	0.0331	0.0700	0.0627	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Lead-210	-0.769	U	1.54	1.54		1.30	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Lead-212	0.0112	U	0.0947	0.0947		0.0772	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Lead-214	0.211		0.0794	0.0823		0.0366	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Potassium-40	6.91		1.35	1.52		0.223	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Protactinium-231	-0.814	U	2.85	2.85		2.32	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Protactinium-234	0.0456	U	0.121	0.121		0.186	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Radium-226	0.390		0.110	0.117	0.200	0.0293	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Radium-228	0.376		0.208	0.211		0.0777	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Thallium-208	0.0378	U	0.0917	0.0917		0.0438	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Thorium-232	0.376		0.208	0.211		0.0777	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Thorium-234	-0.308	U	0.697	0.698		0.584	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Thorium 228	0.0112	U	0.0947	0.0947		0.0772	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Uranium-235	0.0322	U	0.0838	0.0839		0.312	pCi/g	11/02/20 17:57	11/26/20 10:59	1
Uranium-238	-0.308	U	0.697	0.698		0.584	pCi/g	11/02/20 17:57	11/26/20 10:59	1

Client Sample ID: HPPG-317364365-SU28A-015

Lab Sample ID: 160-40091-15

Date Collected: 10/21/20 15:58

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.199	U	0.453	0.454		0.272	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Actinium 228	0.330		0.127	0.131		0.0271	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Bismuth-212	0.226	U	0.657	0.657		0.519	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Bismuth-214	0.0648	U	0.171	0.171		0.128	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Cesium-137	0.0219	U	0.0417	0.0418	0.0700	0.0316	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Lead-210	-1.64	U	1.26	1.27		1.36	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Lead-212	0.343		0.0841	0.0951		0.0447	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Lead-214	0.258		0.0923	0.0961		0.0897	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Potassium-40	7.24		1.20	1.41		0.277	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Protactinium-231	0.000	U	0.332	0.332		1.92	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Protactinium-234	0.0681	U	0.170	0.170		0.136	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Radium-226	0.0648	U	0.171	0.171	0.200	0.128	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Radium-228	0.330		0.127	0.131		0.0271	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Thallium-208	0.141		0.0457	0.0480		0.0171	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Thorium-232	0.330		0.127	0.131		0.0271	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Thorium-234	-0.495	U	0.521	0.524		0.483	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Thorium 228	0.343		0.0841	0.0951		0.0447	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Uranium-235	0.106	U	0.255	0.255		0.205	pCi/g	11/02/20 17:57	11/26/20 11:07	1
Uranium-238	-0.495	U	0.521	0.524		0.483	pCi/g	11/02/20 17:57	11/26/20 11:07	1

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-016

Lab Sample ID: 160-40091-16

Date Collected: 10/21/20 16:01

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.419		0.447	0.450		0.369	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Actinium 228	0.277		0.214	0.216		0.107	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Bismuth-212	-0.214	U	1.02	1.02		0.816	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Bismuth-214	0.132	U	0.122	0.123		0.189	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Cesium-137	-0.0909	U	0.138	0.139	0.0700	0.0946	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Lead-210	0.824		1.09	1.09		0.740	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Lead-212	0.455		0.108	0.123		0.0488	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Lead-214	0.338		0.134	0.138		0.0776	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Potassium-40	7.34		1.60	1.77		0.320	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Protactinium-231	-0.934	U	3.13	3.13		2.54	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Protactinium-234	0.0317	U	0.0665	0.0666		0.189	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Radium-226	0.132	U	0.122	0.123	0.200	0.189	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Radium-228	0.277		0.214	0.216		0.107	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Thallium-208	0.191		0.0721	0.0748		0.0211	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Thorium-232	0.277		0.214	0.216		0.107	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Thorium-234	0.713		0.663	0.668		0.389	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Thorium 228	0.455		0.108	0.123		0.0488	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Uranium-235	-0.107	U	0.127	0.128		0.296	pCi/g	11/02/20 17:57	11/26/20 11:00	1
Uranium-238	0.713		0.663	0.668		0.389	pCi/g	11/02/20 17:57	11/26/20 11:00	1

Client Sample ID: HPPG-317364365-SU28A-017

Lab Sample ID: 160-40091-17

Date Collected: 10/21/20 16:06

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0114	U	0.0346	0.0346		0.410	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Actinium 228	0.568		0.183	0.192		0.0524	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Bismuth-212	0.000	U	0.334	0.334		0.600	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Bismuth-214	0.429		0.130	0.137		0.0528	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Cesium-137	0.00115	U	0.0559	0.0559	0.0700	0.0459	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Lead-210	0.655	U	1.52	1.52		1.22	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Lead-212	0.447		0.0913	0.108		0.0403	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Lead-214	0.432		0.108	0.116		0.0501	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Potassium-40	8.44		1.38	1.63		0.334	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Protactinium-231	0.000	U	0.232	0.232		2.19	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Protactinium-234	0.0926	U	0.258	0.258		0.227	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Radium-226	0.429		0.130	0.137	0.200	0.0528	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Radium-228	0.568		0.183	0.192		0.0524	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Thallium-208	0.163		0.0514	0.0541		0.0156	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Thorium-232	0.568		0.183	0.192		0.0524	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Thorium-234	0.365	U	0.585	0.586		0.412	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Thorium 228	0.447		0.0913	0.108		0.0403	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Uranium-235	0.152	U	0.276	0.276		0.210	pCi/g	11/02/20 17:57	11/26/20 11:03	1
Uranium-238	0.365	U	0.585	0.586		0.412	pCi/g	11/02/20 17:57	11/26/20 11:03	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-018

Lab Sample ID: 160-40091-18

Date Collected: 10/21/20 16:08

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0835	U	0.617	0.617		0.380	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Actinium 228	0.521		0.171	0.179		0.0329	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Bismuth-212	-0.0922	U	0.940	0.940		0.767	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Bismuth-214	0.412		0.142	0.148		0.0585	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Cesium-137	-0.0318	U	0.0880	0.0880	0.0700	0.0702	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Lead-210	0.816	U	1.65	1.66		1.09	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Lead-212	0.386		0.0901	0.0987		0.0430	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Lead-214	0.394		0.101	0.109		0.0610	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Potassium-40	8.87		1.39	1.66		0.128	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Protactinium-231	-0.878	U	3.00	3.00		2.44	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Protactinium-234	-0.0124	U	0.0250	0.0251		0.284	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Radium-226	0.412		0.142	0.148	0.200	0.0585	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Radium-228	0.521		0.171	0.179		0.0329	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Thallium-208	0.207		0.0539	0.0578		0.00817	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Thorium-232	0.521		0.171	0.179		0.0329	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Thorium-234	0.676		0.588	0.593		0.478	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Thorium 228	0.386		0.0901	0.0987		0.0430	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Uranium-235	0.251	U	0.362	0.363		0.472	pCi/g	11/02/20 17:57	11/26/20 11:04	1
Uranium-238	0.676		0.588	0.593		0.478	pCi/g	11/02/20 17:57	11/26/20 11:04	1

Client Sample ID: HPPG-317364365-SU28A-019

Lab Sample ID: 160-40091-19

Date Collected: 10/21/20 16:10

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0438	U	0.131	0.131		0.267	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Actinium 228	0.349		0.178	0.182		0.0714	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Bismuth-212	0.250	U	0.457	0.458		0.347	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Bismuth-214	0.306		0.106	0.110		0.0481	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Cesium-137	0.0244	U	0.0480	0.0480	0.0700	0.0373	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Lead-210	0.363	U	0.984	0.985		0.788	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Lead-212	0.389		0.0649	0.0822		0.0166	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Lead-214	0.356		0.0864	0.0940		0.0539	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Potassium-40	7.69		1.09	1.34		0.0892	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Protactinium-231	0.665		0.639	0.643		0.345	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Protactinium-234	0.0848	U	0.205	0.205		0.166	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Radium-226	0.306		0.106	0.110	0.200	0.0481	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Radium-228	0.349		0.178	0.182		0.0714	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Thallium-208	0.142		0.0367	0.0396		0.00552	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Thorium-232	0.349		0.178	0.182		0.0714	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Thorium-234	-0.301	U	0.970	0.971		0.792	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Thorium 228	0.389		0.0649	0.0822		0.0166	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Uranium-235	-0.149	U	0.419	0.419		0.341	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Uranium-238	-0.301	U	0.970	0.971		0.792	pCi/g	11/02/20 17:57	11/26/20 11:09	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-020

Lab Sample ID: 160-40091-20

Date Collected: 10/21/20 16:12

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.419	U	0.592	0.595		0.439	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Actinium 228	0.267		0.129	0.132		0.0339	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Bismuth-212	-0.637	U	0.979	0.981		0.756	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Bismuth-214	0.302		0.116	0.120		0.0495	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Cesium-137	-0.0548	U	0.0881	0.0883	0.0700	0.0686	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Lead-210	-0.147	U	1.34	1.34		1.10	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Lead-212	0.254		0.0906	0.0963		0.0568	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Lead-214	0.317		0.101	0.107		0.0524	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Potassium-40	7.70		1.36	1.57		0.139	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Protactinium-231	0.327	U	1.33	1.33		2.07	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Protactinium-234	-0.0299	U	0.0520	0.0520		0.241	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Radium-226	0.302		0.116	0.120	0.200	0.0495	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Radium-228	0.267		0.129	0.132		0.0339	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Thallium-208	0.109		0.0769	0.0777		0.0341	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Thorium-232	0.267		0.129	0.132		0.0339	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Thorium-234	0.0688	U	0.211	0.211		0.963	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Thorium 228	0.254		0.0906	0.0963		0.0568	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Uranium-235	-0.0198	U	0.620	0.620		0.433	pCi/g	11/02/20 17:57	11/26/20 11:09	1
Uranium-238	0.0688	U	0.211	0.211		0.963	pCi/g	11/02/20 17:57	11/26/20 11:09	1

Client Sample ID: HPPG-317364365-SU28A-021

Lab Sample ID: 160-40091-21

Date Collected: 10/21/20 16:14

Matrix: Solid

Date Received: 10/26/20 08:38

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Total Beta Strontium	0.00871	U	0.0623	0.0623	0.160	0.0505	pCi/g	11/06/20 11:01	11/26/20 10:44	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	87.7		40 - 110					11/06/20 11:01	11/26/20 10:44	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Plutonium-238	0.00834		0.0118	0.0118	0.100	0.00686	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	0.00209	U	0.0125	0.0125	0.100	0.00971	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	100		30 - 110					12/15/20 12:11	12/23/20 14:28	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Uranium-234	0.445		0.0629	0.0732	0.250	0.00718	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	0.0109		0.0172	0.0172	0.100	0.0109	pCi/g	11/03/20 12:03	12/03/20 16:16	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-021

Lab Sample ID: 160-40091-21

Date Collected: 10/21/20 16:14

Matrix: Solid

Date Received: 10/26/20 08:38

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-238	0.494		0.0659	0.0779	0.250	0.00507	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	83.3		30 - 110					11/03/20 12:03	12/03/20 16:16	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.209	U	0.503	0.504		0.324	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Actinium 228	0.545		0.144	0.154		0.0609	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Bismuth-212	-0.0750	U	0.767	0.767		0.626	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Bismuth-214	0.342		0.122	0.127		0.0530	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Cesium-137	0.0273	U	0.0508	0.0508	0.0700	0.0388	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Lead-210	-0.787	U	1.71	1.71		1.43	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Lead-212	0.437		0.0860	0.103		0.0364	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Lead-214	0.388		0.104	0.111		0.0450	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Potassium-40	8.85		1.34	1.62		0.284	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Protactinium-231	0.000	U	0.740	0.740		2.13	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Protactinium-234	-0.101	U	0.321	0.322		0.262	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Radium-226	0.342		0.122	0.127	0.200	0.0530	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Radium-228	0.545		0.144	0.154		0.0609	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Thallium-208	0.0591		0.0973	0.0975		0.0499	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Thorium-232	0.545		0.144	0.154		0.0609	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Thorium-234	0.665		0.632	0.636		0.432	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Thorium 228	0.437		0.0860	0.103		0.0364	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Uranium-235	0.0909	U	0.202	0.203		0.472	pCi/g	11/02/20 17:57	11/26/20 11:11	1
Uranium-238	0.665		0.632	0.636		0.432	pCi/g	11/02/20 17:57	11/26/20 11:11	1

Client Sample ID: HPPG-317364365-SU28A-022

Lab Sample ID: 160-40091-22

Date Collected: 10/21/20 16:16

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.213	U	0.440	0.440		0.354	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Actinium 228	0.447		0.176	0.182		0.117	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Bismuth-212	-0.676	U	1.08	1.08		0.837	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Bismuth-214	0.382		0.115	0.122		0.0419	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Cesium-137	0.0247	U	0.0554	0.0554	0.0700	0.0426	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Lead-210	-0.177	U	1.65	1.65		1.36	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Lead-212	0.295		0.0967	0.104		0.0588	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Lead-214	0.491		0.116	0.126		0.0518	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Potassium-40	7.03		1.33	1.52		0.148	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Protactinium-231	0.000	U	0.715	0.715		2.23	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Protactinium-234	0.0949	U	0.253	0.253		0.204	pCi/g	11/04/20 17:38	11/25/20 17:58	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-022

Lab Sample ID: 160-40091-22

Date Collected: 10/21/20 16:16

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Radium-226	0.382		0.115	0.122	0.200	0.0419	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Radium-228	0.447		0.176	0.182		0.117	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Thallium-208	0.159		0.0772	0.0789		0.0444	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Thorium-232	0.447		0.176	0.182		0.117	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Thorium-234	-0.883	U	0.872	0.878		1.10	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Thorium 228	0.295		0.0967	0.104		0.0588	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Uranium-235	-0.195	U	0.464	0.464		0.467	pCi/g	11/04/20 17:38	11/25/20 17:58	1
Uranium-238	-0.883	U	0.872	0.878		1.10	pCi/g	11/04/20 17:38	11/25/20 17:58	1

Client Sample ID: HPPG-317364365-SU28A-023

Lab Sample ID: 160-40091-23

Date Collected: 10/21/20 16:19

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.0686	U	0.361	0.362		0.212	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Actinium 228	0.301		0.110	0.114		0.0755	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Bismuth-212	-0.275	U	0.582	0.582		0.458	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Bismuth-214	0.221		0.0745	0.0779		0.0353	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Cesium-137	0.00513	U	0.0350	0.0350	0.0700	0.0283	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Lead-210	0.443	U	0.966	0.967		0.772	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Lead-212	0.0317	U	0.0776	0.0777		0.0625	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Lead-214	0.223		0.0674	0.0713		0.0671	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Potassium-40	7.13		0.970	1.21		0.0769	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Protactinium-231	-0.588	U	1.81	1.81		1.47	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Protactinium-234	0.0848	U	0.143	0.143		0.139	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Radium-226	0.221		0.0745	0.0779	0.200	0.0353	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Radium-228	0.301		0.110	0.114		0.0755	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Thallium-208	0.112		0.0354	0.0373		0.00953	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Thorium-232	0.301		0.110	0.114		0.0755	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Thorium-234	0.281		0.394	0.395		0.260	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Thorium 228	0.0317	U	0.0776	0.0777		0.0625	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Uranium-235	-0.0562	U	0.126	0.126		0.302	pCi/g	11/03/20 18:38	12/01/20 21:50	1
Uranium-238	0.281		0.394	0.395		0.260	pCi/g	11/03/20 18:38	12/01/20 21:50	1

Client Sample ID: HPPG-317364365-SU28A-024

Lab Sample ID: 160-40091-24

Date Collected: 10/21/20 16:22

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.0596	U	0.392	0.392		0.327	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Actinium 228	0.220		0.0910	0.0945		0.141	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Bismuth-212	0.414	U	0.961	0.962		0.758	pCi/g	11/03/20 18:38	12/01/20 21:52	1

Eurofins TestAmerica, St. Louis

Client Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Client Sample ID: HPPG-317364365-SU28A-024

Lab Sample ID: 160-40091-24

Date Collected: 10/21/20 16:22

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Bismuth-214	0.317		0.129	0.134		0.0554	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Cesium-137	0.0168	U	0.0442	0.0442	0.0700	0.0338	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Lead-210	-0.746	U	1.80	1.81		1.51	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Lead-212	0.276		0.117	0.121		0.0610	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Lead-214	0.245		0.117	0.120		0.0756	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Potassium-40	7.99		1.37	1.65		0.270	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Protactinium-231	0.747	U	1.90	1.91		2.09	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Protactinium-234	0.0473	U	0.104	0.104		0.263	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Radium-226	0.317		0.129	0.134	0.200	0.0554	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Radium-228	0.220		0.0910	0.0945		0.141	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Thallium-208	0.115		0.0939	0.0948		0.0440	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Thorium-232	0.220		0.0910	0.0945		0.141	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Thorium-234	0.583		0.514	0.519		0.402	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Thorium 228	0.276		0.117	0.121		0.0610	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Uranium-235	0.102	U	0.222	0.222		0.542	pCi/g	11/03/20 18:38	12/01/20 21:52	1
Uranium-238	0.583		0.514	0.519		0.402	pCi/g	11/03/20 18:38	12/01/20 21:52	1

Client Sample ID: HPPG-317364365-SU28A-025

Lab Sample ID: 160-40091-25

Date Collected: 10/21/20 16:25

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	-0.323	U	0.692	0.694		0.417	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Actinium 228	0.142	U	0.270	0.271		0.149	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Bismuth-212	0.0178	U	0.752	0.752		0.617	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Bismuth-214	0.400		0.131	0.137		0.0477	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Cesium-137	0.0000949	U	0.0622	0.0622	0.0700	0.0509	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Lead-210	-0.406	U	1.39	1.39		1.00	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Lead-212	0.406		0.0894	0.104		0.0367	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Lead-214	0.476		0.131	0.140		0.0809	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Potassium-40	7.07		1.42	1.60		0.264	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Protactinium-231	0.319	U	0.930	0.930		1.49	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Protactinium-234	0.0984	U	0.183	0.183		0.169	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Radium-226	0.400		0.131	0.137	0.200	0.0477	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Radium-228	0.142	U	0.270	0.271		0.149	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Thallium-208	0.120		0.0588	0.0601		0.0239	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Thorium-232	0.142	U	0.270	0.271		0.149	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Thorium-234	0.891		0.485	0.495		0.304	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Thorium 228	0.406		0.0894	0.104		0.0367	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Uranium-235	0.106	U	0.308	0.308		0.297	pCi/g	11/03/20 18:38	12/01/20 22:28	1
Uranium-238	0.891		0.485	0.495		0.304	pCi/g	11/03/20 18:38	12/01/20 22:28	1

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Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Client Sample ID: HPPG-F-015

Lab Sample ID: 160-40091-26

Date Collected: 10/21/20 15:22

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.114	U	0.432	0.432		0.252	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Actinium 228	0.536		0.191	0.199		0.104	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Bismuth-212	0.000	U	0.363	0.363		0.540	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Bismuth-214	0.329		0.108	0.113		0.0474	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Cesium-137	0.0124	U	0.0503	0.0503	0.0700	0.0269	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Lead-210	0.573	U	1.07	1.07		0.845	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Lead-212	0.460		0.0772	0.0975		0.0301	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Lead-214	0.333		0.0926	0.0988		0.0442	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Potassium-40	8.75		1.17	1.47		0.0914	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Protactinium-231	0.000	U	0.398	0.398		1.85	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Protactinium-234	0.103	U	0.235	0.235		0.152	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Radium-226	0.329		0.108	0.113	0.200	0.0474	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Radium-228	0.536		0.191	0.199		0.104	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Thallium-208	0.161		0.0514	0.0540		0.0160	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Thorium-232	0.536		0.191	0.199		0.104	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Thorium-234	-0.347	U	0.989	0.989		0.806	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Thorium 228	0.460		0.0772	0.0975		0.0301	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Uranium-235	-0.175	U	0.479	0.479		0.390	pCi/g	11/03/20 18:38	12/01/20 22:29	1
Uranium-238	-0.347	U	0.989	0.989		0.806	pCi/g	11/03/20 18:38	12/01/20 22:29	1

Client Sample ID: HPPG-F-016

Lab Sample ID: 160-40091-27

Date Collected: 10/21/20 16:08

Matrix: Solid

Date Received: 10/26/20 08:38

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
			Uncert.	Uncert.						
			(2σ+/-)	(2σ+/-)						
Actinium-227	0.143	U	0.454	0.455		0.393	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Actinium 228	0.402		0.168	0.174		0.191	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Bismuth-212	-0.0461	U	1.04	1.04		0.856	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Bismuth-214	0.443		0.194	0.201		0.0788	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Cesium-137	0.0298	U	0.0617	0.0618	0.0700	0.0469	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Lead-210	-1.16	U	1.89	1.89		1.60	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Lead-212	0.334		0.110	0.117		0.0664	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Lead-214	0.415		0.172	0.179		0.113	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Potassium-40	8.54		1.56	1.84		0.325	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Protactinium-231	-0.599	U	3.09	3.09		2.52	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Protactinium-234	0.112	U	0.300	0.301		0.250	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Radium-226	0.443		0.194	0.201	0.200	0.0788	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Radium-228	0.402		0.168	0.174		0.191	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Thallium-208	0.147		0.0647	0.0669		0.0258	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Thorium-232	0.402		0.168	0.174		0.191	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Thorium-234	0.919		0.773	0.781		0.545	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Thorium 228	0.334		0.110	0.117		0.0664	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Uranium-235	0.155	U	0.595	0.595		0.485	pCi/g	11/03/20 18:38	12/01/20 23:02	1
Uranium-238	0.919		0.773	0.781		0.545	pCi/g	11/03/20 18:38	12/01/20 23:02	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-488460/24-A
Matrix: Solid
Analysis Batch: 490292

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488460

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.01989	U	0.0586	0.0586	0.160	0.0499	pCi/g	11/06/20 11:01	11/26/20 10:48	1
Carrier	MB	MB	Limits				Prepared		Analyzed	
Sr Carrier	%Yield	Qualifier	40 - 110				11/06/20 11:01		11/26/20 10:48	
	86.4									

Lab Sample ID: LCS 160-488460/1-A
Matrix: Solid
Analysis Batch: 490302

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488460

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.77	6.487		0.537	0.160	0.0549	pCi/g	83	75 - 125	
Carrier	LCS	LCS	Limits							
Sr Carrier	%Yield	Qualifier	40 - 110							
	89.5									

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-487802/1-A
Matrix: Solid
Analysis Batch: 490870

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487802

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.006585	U	0.0116	0.0116	0.250	0.00722	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-235/236	-0.002731	U	0.00546	0.00547	0.100	0.00635	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Uranium-238	0.008762		0.00876	0.00879	0.250	0.00510	pCi/g	11/03/20 12:03	12/03/20 16:16	1
Tracer	MB	MB	Limits				Prepared		Analyzed	
Uranium-232	%Yield	Qualifier	30 - 110				11/03/20 12:03		12/03/20 16:16	
	81.0									

Lab Sample ID: LCS 160-487802/2-A
Matrix: Solid
Analysis Batch: 490871

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487802

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Uranium-234	3.18	2.913		0.293	0.250	0.0103	pCi/g	91	84 - 120	
Uranium-238	3.26	3.199		0.317	0.250	0.00514	pCi/g	98	82 - 122	
Tracer	LCS	LCS	Limits							
Uranium-232	%Yield	Qualifier	30 - 110							
	75.9									

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-491927/1-A
Matrix: Solid
Analysis Batch: 493064

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 491927

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	0.0000	U	0.0130	0.0130	0.100	0.0107	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Plutonium-239/240	-0.01688	U	0.0124	0.0125	0.100	0.0138	pCi/g	12/15/20 12:11	12/23/20 14:28	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	89.2		30 - 110					12/15/20 12:11	12/23/20 14:28	1

Lab Sample ID: LCS 160-491927/2-A
Matrix: Solid
Analysis Batch: 493065

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 491927

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Plutonium-238	2.61	2.475		0.251	0.100	0.00459	pCi/g	95	80 - 125
Plutonium-239/240	2.64	2.610		0.262	0.100	0.00796	pCi/g	99	81 - 125
Tracer	%Yield	Qualifier	Limits						
Pu-242 (T)	88.4		30 - 110						

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-487736/1-A
Matrix: Solid
Analysis Batch: 490289

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487736

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	-0.2720	U	0.534	0.535		0.305	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Actinium 228	0.06904		0.112	0.112		0.0508	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Bismuth-212	0.2256	U	0.391	0.391		0.281	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Bismuth-214	-0.01411	U	0.137	0.137		0.114	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Cesium-137	0.01799	U	0.0299	0.0300	0.0700	0.0211	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Lead-210	0.0000	U	0.266	0.266		0.821	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Lead-212	-0.06622	U	0.0814	0.0819		0.0926	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Lead-214	-0.01264	U	0.0648	0.0648		0.0539	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Potassium-40	-0.1927	U	0.684	0.685		0.430	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Protactinium-231	0.0000	U	0.422	0.422		1.34	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Protactinium-234	0.1019	U	0.0770	0.0777		0.135	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Radium-226	-0.01411	U	0.137	0.137	0.200	0.114	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Radium-228	0.06904		0.112	0.112		0.0508	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Thallium-208	-0.0008951	U	0.00144	0.00144		0.0283	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Thorium-232	0.06904		0.112	0.112		0.0508	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Thorium-234	0.1076	U	0.274	0.275		0.516	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Thorium 228	-0.06622	U	0.0814	0.0819		0.0926	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Uranium-235	-0.1276	U	0.343	0.343		0.277	pCi/g	11/02/20 15:15	11/26/20 12:47	1
Uranium-238	0.1076	U	0.274	0.275		0.516	pCi/g	11/02/20 15:15	11/26/20 12:47	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-487736/2-A
Matrix: Solid
Analysis Batch: 490283

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487736

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	101.2		11.9		0.535	pCi/g	105	87 - 116	
Cesium-137	26.8	29.82		3.13	0.0700	0.133	pCi/g	111	87 - 120	
Cobalt-60	9.53	10.35		1.09		0.0507	pCi/g	109	87 - 115	

Lab Sample ID: 160-40091-12 DU
Matrix: Solid
Analysis Batch: 490286

Client Sample ID: HPPG-317364365-SU28A-012
Prep Type: Total/NA
Prep Batch: 487736

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium-227	0.0888	U	0.1457	U	0.442		0.334	pCi/g	0.06	1
Actinium 228	0.444		0.2050		0.121		0.159	pCi/g	0.90	1
Bismuth-212	-0.467	U	0.4631	U	0.943		0.738	pCi/g	0.56	1
Bismuth-214	0.235		0.4824		0.149		0.0550	pCi/g	1.02	1
Cesium-137	0.00289	U	-0.00757	U	0.0739	0.0700	0.0417	pCi/g	0.09	1
Lead-210	0.203	U	1.089		1.40		0.927	pCi/g	0.32	1
Lead-212	0.382		0.3730		0.111		0.0552	pCi/g	0.04	1
Lead-214	0.465		0.3193		0.129		0.0624	pCi/g	0.61	1
Potassium-40	8.34		9.310		1.77		0.333	pCi/g	0.30	1
Protactinium-231	0.000	U	0.7445	U	2.02		2.21	pCi/g	0.31	1
Protactinium-234	0.0807	U	-0.1073	U	0.336		0.273	pCi/g	0.31	1
Radium-226	0.235		0.4824		0.149	0.200	0.0550	pCi/g	1.02	1
Radium-228	0.444		0.2050		0.121		0.159	pCi/g	0.90	1
Thallium-208	0.228		0.1913		0.0600		0.0166	pCi/g	0.28	1
Thorium-232	0.444		0.2050		0.121		0.159	pCi/g	0.90	1
Thorium-234	-0.378	U	-0.3692	U	1.12		0.930	pCi/g	0	1
Thorium 228	0.382		0.3730		0.111		0.0552	pCi/g	0.04	1
Uranium-235	0.0891	U	0.0000	U	0.164		0.500	pCi/g	0.26	1
Uranium-238	-0.378	U	-0.3692	U	1.12		0.930	pCi/g	0	1

Lab Sample ID: MB 160-487748/1-A
Matrix: Solid
Analysis Batch: 490284

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487748

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.04976	U	0.0934	0.0935		0.0883	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Bismuth-212	0.0000	U	0.245	0.245		0.188	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Bismuth-214	-0.04153	U	0.129	0.129		0.108	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Cesium-137	0.0000	U	0.00904	0.00904	0.0700	0.0192	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Lead-210	0.3548	U	0.673	0.674		0.514	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Lead-212	0.02518	U	0.0734	0.0734		0.0587	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Lead-214	0.003956	U	0.0202	0.0202		0.0598	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Potassium-40	0.2366		0.212	0.213		0.110	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Protactinium-231	0.0000	U	0.263	0.263		1.33	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Protactinium-234	0.1210	U	0.191	0.191		0.130	pCi/g	11/02/20 17:57	11/26/20 10:12	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-487748/1-A
Matrix: Solid
Analysis Batch: 490284

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 487748

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-226	-0.04153	U	0.129	0.129	0.200	0.108	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Radium-228	0.04976	U	0.0934	0.0935		0.0883	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Thallium-208	-0.04052	U	0.0744	0.0745		0.0390	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Thorium-232	0.04976	U	0.0934	0.0935		0.0883	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Thorium-234	-0.2016	U	0.734	0.735		0.597	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Thorium 228	0.02518	U	0.0734	0.0734		0.0587	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Uranium-235	0.0000	U	0.126	0.126		0.237	pCi/g	11/02/20 17:57	11/26/20 10:12	1
Uranium-238	-0.2016	U	0.734	0.735		0.597	pCi/g	11/02/20 17:57	11/26/20 10:12	1

Lab Sample ID: LCS 160-487748/2-A
Matrix: Solid
Analysis Batch: 490338

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 487748

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits
				Uncert. (2σ+/-)					
Americium-241	96.4	97.61		11.4		0.503	pCi/g	101	87 - 116
Cesium-137	26.8	27.93		2.95	0.0700	0.106	pCi/g	104	87 - 120
Cobalt-60	9.52	9.537		1.02		0.0382	pCi/g	100	87 - 115

Lab Sample ID: MB 160-488132/1-A
Matrix: Solid
Analysis Batch: 490615

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488132

Analyte	MB MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium-227	0.009977	U	0.0270	0.0270		0.294	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Actinium 228	-0.007761	U	0.0124	0.0125		0.138	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Bismuth-212	0.2527	U	0.544	0.545		0.409	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Bismuth-214	-0.03229	U	0.160	0.160		0.133	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Cesium-137	-0.03466	U	0.0621	0.0622	0.0700	0.0473	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Lead-210	0.4648	U	1.28	1.28		0.898	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Lead-212	0.09539	U	0.0865	0.0873		0.0632	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Lead-214	-0.09745	U	0.0727	0.0734		0.0988	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Potassium-40	0.03303	U	0.830	0.830		0.491	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Protactinium-231	0.5484	U	1.57	1.57		1.72	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Protactinium-234	0.07113	U	0.178	0.178		0.106	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Radium-226	-0.03229	U	0.160	0.160	0.200	0.133	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Radium-228	-0.007761	U	0.0124	0.0125		0.138	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Thallium-208	-0.04653	U	0.0864	0.0865		0.0492	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Thorium-232	-0.007761	U	0.0124	0.0125		0.138	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Thorium-234	-0.4923	U	0.834	0.836		0.667	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Thorium 228	0.09539	U	0.0865	0.0873		0.0632	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Uranium-235	-0.02091	U	0.450	0.450		0.205	pCi/g	11/03/20 18:38	12/01/20 22:02	1
Uranium-238	-0.4923	U	0.834	0.836		0.667	pCi/g	11/03/20 18:38	12/01/20 22:02	1

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488132/2-A
Matrix: Solid
Analysis Batch: 490612

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488132

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	95.77		10.1		0.656	pCi/g	99	87 - 116	
Cesium-137	26.7	26.51		2.86	0.0700	0.114	pCi/g	99	87 - 120	
Cobalt-60	9.51	9.333		1.01		0.0186	pCi/g	98	87 - 115	

Lab Sample ID: 160-40091-23 DU
Matrix: Solid
Analysis Batch: 490652

Client Sample ID: HPPG-317364365-SU28A-023
Prep Type: Total/NA
Prep Batch: 488132

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER
										Limit
Actinium-227	-0.0686	U	0.04104	U	0.132		0.233	pCi/g	0.22	1
Actinium 228	0.301		0.1222		0.0905		0.0978	pCi/g	0.87	1
Bismuth-212	-0.275	U	0.01884	U	0.443		0.363	pCi/g	0.29	1
Bismuth-214	0.221		0.2102		0.0900		0.0403	pCi/g	0.06	1
Cesium-137	0.00513	U	0.003469	U	0.0469	0.0700	0.0384	pCi/g	0.02	1
Lead-210	0.443	U	-0.02737	U	0.892		0.733	pCi/g	0.25	1
Lead-212	0.0317	U	0.01696	U	0.0813		0.0660	pCi/g	0.09	1
Lead-214	0.223		0.3350		0.0835		0.0330	pCi/g	0.73	1
Potassium-40	7.13		6.955		1.24		0.226	pCi/g	0.07	1
Protactinium-231	-0.588	U	0.2395	U	0.948		1.49	pCi/g	0.30	1
Protactinium-234	0.0848	U	0.05747	U	0.165		0.134	pCi/g	0.09	1
Radium-226	0.221		0.2102		0.0900	0.200	0.0403	pCi/g	0.06	1
Radium-228	0.301		0.1222		0.0905		0.0978	pCi/g	0.87	1
Thallium-208	0.112		0.08678		0.0330		0.0105	pCi/g	0.37	1
Thorium-232	0.301		0.1222		0.0905		0.0978	pCi/g	0.87	1
Thorium-234	0.281		0.05146	U	0.0799		0.654	pCi/g	0.48	1
Thorium 228	0.0317	U	0.01696	U	0.0813		0.0660	pCi/g	0.09	1
Uranium-235	-0.0562	U	0.03824	U	0.174		0.256	pCi/g	0.31	1
Uranium-238	0.281		0.05146	U	0.0799		0.654	pCi/g	0.48	1

Lab Sample ID: MB 160-488229/1-A
Matrix: Solid
Analysis Batch: 490261

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488229

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium-227	0.009307	U	0.0193	0.0193		0.451	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Actinium 228	-0.03281	U	0.0424	0.0425		0.207	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Bismuth-212	0.0000	U	0.211	0.211		0.491	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Bismuth-214	-0.1961	U	0.130	0.131		0.299	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Cesium-137	-0.01941	U	0.0667	0.0667	0.0700	0.0572	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Lead-210	0.3158	U	1.03	1.03		0.730	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Lead-212	0.02194	U	0.124	0.124		0.100	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Lead-214	-0.02104	U	0.105	0.106		0.0884	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Potassium-40	-0.3910	U	1.27	1.27		0.629	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Protactinium-231	0.0000	U	0.266	0.266		2.38	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Protactinium-234	0.09066	U	0.244	0.244		0.115	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Radium-226	-0.1961	U	0.130	0.131	0.200	0.299	pCi/g	11/04/20 17:38	11/25/20 17:48	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: MB 160-488229/1-A
Matrix: Solid
Analysis Batch: 490261

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488229

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Radium-228	-0.03281	U	0.0424	0.0425		0.207	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Thallium-208	0.06514		0.0492	0.0497		0.0280	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Thorium-232	-0.03281	U	0.0424	0.0425		0.207	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Thorium-234	-0.3284	U	0.611	0.612		0.523	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Thorium 228	0.02194	U	0.124	0.124		0.100	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Uranium-235	0.05125	U	0.114	0.114		0.231	pCi/g	11/04/20 17:38	11/25/20 17:48	1
Uranium-238	-0.3284	U	0.611	0.612		0.523	pCi/g	11/04/20 17:38	11/25/20 17:48	1

Lab Sample ID: LCS 160-488229/2-A
Matrix: Solid
Analysis Batch: 490255

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488229

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec.
				Uncert. (2σ+/-)					Limits
Americium-241	96.4	101.1		10.6		0.453	pCi/g	105	87 - 116
Cesium-137	26.8	25.32		2.69	0.0700	0.0777	pCi/g	95	87 - 120
Cobalt-60	9.53	9.078		0.954		0.0437	pCi/g	95	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
 SDG: GJ46599780

Rad

Leach Batch: 486980

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-1	HPPG-317364365-SU28A-001	Total/NA	Solid	Dry and Grind	
160-40091-2	HPPG-317364365-SU28A-002	Total/NA	Solid	Dry and Grind	
160-40091-3	HPPG-317364365-SU28A-003	Total/NA	Solid	Dry and Grind	
160-40091-4	HPPG-317364365-SU28A-004	Total/NA	Solid	Dry and Grind	
160-40091-5	HPPG-317364365-SU28A-005	Total/NA	Solid	Dry and Grind	
160-40091-6	HPPG-317364365-SU28A-006	Total/NA	Solid	Dry and Grind	
160-40091-7	HPPG-317364365-SU28A-007	Total/NA	Solid	Dry and Grind	
160-40091-8	HPPG-317364365-SU28A-008	Total/NA	Solid	Dry and Grind	
160-40091-9	HPPG-317364365-SU28A-009	Total/NA	Solid	Dry and Grind	
160-40091-10	HPPG-317364365-SU28A-010	Total/NA	Solid	Dry and Grind	
160-40091-11	HPPG-317364365-SU28A-011	Total/NA	Solid	Dry and Grind	
160-40091-12	HPPG-317364365-SU28A-012	Total/NA	Solid	Dry and Grind	
160-40091-13	HPPG-317364365-SU28A-013	Total/NA	Solid	Dry and Grind	
160-40091-14	HPPG-317364365-SU28A-014	Total/NA	Solid	Dry and Grind	
160-40091-15	HPPG-317364365-SU28A-015	Total/NA	Solid	Dry and Grind	
160-40091-16	HPPG-317364365-SU28A-016	Total/NA	Solid	Dry and Grind	
160-40091-17	HPPG-317364365-SU28A-017	Total/NA	Solid	Dry and Grind	
160-40091-18	HPPG-317364365-SU28A-018	Total/NA	Solid	Dry and Grind	
160-40091-19	HPPG-317364365-SU28A-019	Total/NA	Solid	Dry and Grind	
160-40091-20	HPPG-317364365-SU28A-020	Total/NA	Solid	Dry and Grind	
160-40091-21	HPPG-317364365-SU28A-021	Total/NA	Solid	Dry and Grind	
160-40091-12 DU	HPPG-317364365-SU28A-012	Total/NA	Solid	Dry and Grind	

Leach Batch: 487040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-22	HPPG-317364365-SU28A-022	Total/NA	Solid	Dry and Grind	
160-40091-23	HPPG-317364365-SU28A-023	Total/NA	Solid	Dry and Grind	
160-40091-24	HPPG-317364365-SU28A-024	Total/NA	Solid	Dry and Grind	
160-40091-25	HPPG-317364365-SU28A-025	Total/NA	Solid	Dry and Grind	
160-40091-26	HPPG-F-015	Total/NA	Solid	Dry and Grind	
160-40091-27	HPPG-F-016	Total/NA	Solid	Dry and Grind	
160-40091-23 DU	HPPG-317364365-SU28A-023	Total/NA	Solid	Dry and Grind	

Prep Batch: 487736

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-1	HPPG-317364365-SU28A-001	Total/NA	Solid	Fill_Geo-21	486980
160-40091-2	HPPG-317364365-SU28A-002	Total/NA	Solid	Fill_Geo-21	486980
160-40091-3	HPPG-317364365-SU28A-003	Total/NA	Solid	Fill_Geo-21	486980
160-40091-4	HPPG-317364365-SU28A-004	Total/NA	Solid	Fill_Geo-21	486980
160-40091-5	HPPG-317364365-SU28A-005	Total/NA	Solid	Fill_Geo-21	486980
160-40091-6	HPPG-317364365-SU28A-006	Total/NA	Solid	Fill_Geo-21	486980
160-40091-7	HPPG-317364365-SU28A-007	Total/NA	Solid	Fill_Geo-21	486980
160-40091-8	HPPG-317364365-SU28A-008	Total/NA	Solid	Fill_Geo-21	486980
160-40091-9	HPPG-317364365-SU28A-009	Total/NA	Solid	Fill_Geo-21	486980
160-40091-10	HPPG-317364365-SU28A-010	Total/NA	Solid	Fill_Geo-21	486980
160-40091-11	HPPG-317364365-SU28A-011	Total/NA	Solid	Fill_Geo-21	486980
160-40091-12	HPPG-317364365-SU28A-012	Total/NA	Solid	Fill_Geo-21	486980
MB 160-487736/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487736/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40091-12 DU	HPPG-317364365-SU28A-012	Total/NA	Solid	Fill_Geo-21	486980

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Rad

Prep Batch: 487748

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-13	HPPG-317364365-SU28A-013	Total/NA	Solid	Fill_Geo-21	486980
160-40091-14	HPPG-317364365-SU28A-014	Total/NA	Solid	Fill_Geo-21	486980
160-40091-15	HPPG-317364365-SU28A-015	Total/NA	Solid	Fill_Geo-21	486980
160-40091-16	HPPG-317364365-SU28A-016	Total/NA	Solid	Fill_Geo-21	486980
160-40091-17	HPPG-317364365-SU28A-017	Total/NA	Solid	Fill_Geo-21	486980
160-40091-18	HPPG-317364365-SU28A-018	Total/NA	Solid	Fill_Geo-21	486980
160-40091-19	HPPG-317364365-SU28A-019	Total/NA	Solid	Fill_Geo-21	486980
160-40091-20	HPPG-317364365-SU28A-020	Total/NA	Solid	Fill_Geo-21	486980
160-40091-21	HPPG-317364365-SU28A-021	Total/NA	Solid	Fill_Geo-21	486980
MB 160-487748/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-487748/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 487802

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-1	HPPG-317364365-SU28A-001	Total/NA	Solid	ExtChrom	486980
160-40091-11	HPPG-317364365-SU28A-011	Total/NA	Solid	ExtChrom	486980
160-40091-21	HPPG-317364365-SU28A-021	Total/NA	Solid	ExtChrom	486980
MB 160-487802/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-487802/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 488132

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-23	HPPG-317364365-SU28A-023	Total/NA	Solid	Fill_Geo-21	487040
160-40091-24	HPPG-317364365-SU28A-024	Total/NA	Solid	Fill_Geo-21	487040
160-40091-25	HPPG-317364365-SU28A-025	Total/NA	Solid	Fill_Geo-21	487040
160-40091-26	HPPG-F-015	Total/NA	Solid	Fill_Geo-21	487040
160-40091-27	HPPG-F-016	Total/NA	Solid	Fill_Geo-21	487040
MB 160-488132/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488132/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-40091-23 DU	HPPG-317364365-SU28A-023	Total/NA	Solid	Fill_Geo-21	487040

Prep Batch: 488229

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-22	HPPG-317364365-SU28A-022	Total/NA	Solid	Fill_Geo-21	487040
MB 160-488229/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488229/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488460

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-1	HPPG-317364365-SU28A-001	Total/NA	Solid	DPS-0	486980
160-40091-11	HPPG-317364365-SU28A-011	Total/NA	Solid	DPS-0	486980
160-40091-21	HPPG-317364365-SU28A-021	Total/NA	Solid	DPS-0	486980
MB 160-488460/24-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-488460/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Prep Batch: 491927

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40091-1	HPPG-317364365-SU28A-001	Total/NA	Solid	ExtChrom	486980
160-40091-11	HPPG-317364365-SU28A-011	Total/NA	Solid	ExtChrom	486980
160-40091-21	HPPG-317364365-SU28A-021	Total/NA	Solid	ExtChrom	486980
MB 160-491927/1-A	Method Blank	Total/NA	Solid	ExtChrom	

Eurofins TestAmerica, St. Louis

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Rad (Continued)

Prep Batch: 491927 (Continued)

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
LCS 160-491927/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

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Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40091-1
SDG: GJ46599780

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-40091-1	HPPG-317364365-SU28A-001	82.7	
160-40091-11	HPPG-317364365-SU28A-011	90.2	
160-40091-21	HPPG-317364365-SU28A-021	87.7	
LCS 160-488460/1-A	Lab Control Sample	89.5	
MB 160-488460/24-A	Method Blank	86.4	
Tracer/Carrier Legend			
Sr = Sr Carrier			

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-40091-1	HPPG-317364365-SU28A-001	92.6	
160-40091-11	HPPG-317364365-SU28A-011	93.2	
160-40091-21	HPPG-317364365-SU28A-021	100	
LCS 160-491927/2-A	Lab Control Sample	88.4	
MB 160-491927/1-A	Method Blank	89.2	
Tracer/Carrier Legend			
Pu-242 (T) = Pu-242 (T)			

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-40091-1	HPPG-317364365-SU28A-001	82.0	
160-40091-11	HPPG-317364365-SU28A-011	77.1	
160-40091-21	HPPG-317364365-SU28A-021	83.3	
LCS 160-487802/2-A	Lab Control Sample	75.9	
MB 160-487802/1-A	Method Blank	81.0	
Tracer/Carrier Legend			
U-232 = Uranium-232			

ANALYTICAL REPORT

Eurofins TestAmerica, St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

Laboratory Job ID: 160-40097-1
Laboratory Sample Delivery Group: D1189472
Client Project/Site: HPNS-Parcel G 501197
Revision: 1

For:
Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Rose Condit

Rhonda Ridenhower

Authorized for release by:
4/12/2021 4:44:00 PM

Rhonda Ridenhower, Client Service Manager
(314)298-8566
Rhonda.Ridenhower@Eurofinset.com

LINKS

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results through
TotalAccess

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www.eurofinsus.com/Env

This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.



Table of Contents

Cover Page	1
Table of Contents	2
Case Narrative	3
Chain of Custody	6
Receipt Checklists	8
Definitions/Glossary	9
Method Summary	10
Sample Summary	11
Client Sample Results	12
QC Sample Results	13
QC Association Summary	16
Tracer Carrier Summary	17

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Job ID: 160-40097-1

Laboratory: Eurofins TestAmerica, St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: HPNS-Parcel G 501197

Report Number: 160-40097-1

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

Eurofins TestAmerica, St. Louis attests to the validity of the laboratory data generated by Eurofins TestAmerica facilities reported herein. All analyses performed by Eurofins TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. Eurofins TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

Radiochemistry sample results are reported with the count date/time applied as the Activity Reference Date.

The matrix for the Method Blank and LCS is as close to the following samples as can be reasonably achieved. Detailed information can be found in the most current revision of the associated SOP.

This laboratory report is confidential and is intended for the sole use of Eurofins TestAmerica and its client.

Revision 1- Additional information requested in case narrative for total strontium

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Job ID: 160-40097-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

RECEIPT

The samples were received on 10/26/2020; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 16.3 C.

TOTAL BETA STRONTIUM (GFPC)

Sample HPPG-317364365-SU28A-B-001 (160-40097-1) was analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 10/28/2020, prepared on 11/25/2020 and analyzed on 12/11/2020.

When taking small mass aliquots from dried/disaggregated sample, the laboratory avoids large rocks/pebbles (as well as sticks, etc) which may constitute a larger than representative portion of the aliquot. Smaller rocks may be included. This is consistent with QSM and Laboratory SOP:HPPG-317364365-SU28A-B-001 (160-40097-1).

The method blank (MB) Z-score is within limits and is located in the level IV raw data.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC PLUTONIUM (ALPHA SPECTROMETRY)

Sample HPPG-317364365-SU28A-B-001 (160-40097-1) was analyzed for Isotopic Plutonium (Alpha Spectrometry) in accordance with A-01-R. The samples were dried on 10/28/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488774/1-A)

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.HPPG-317364365-SU28A-B-001 (160-40097-1), (LCS 160-488774/2-A), (MB 160-488774/1-A), (160-40094-A-1-E) and (160-40094-A-1-K DU)

During analysis the pulser (used for the daily checks) was left on inadvertently which caused the scaling to be greater than normal. Manual integration was performed in order to "zoom in" to the correct scaling for the samples. Both, the original and the "zoomed in" spectra PDF's, are included in the deliverable. HPPG-317364365-SU28A-B-001 (160-40097-1), (LCS 160-488774/2-A), (MB 160-488774/1-A), (160-40094-A-1-E) and (160-40094-A-1-K DU)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

ISOTOPIC URANIUM (ALPHA SPECTROMETRY)

Sample HPPG-317364365-SU28A-B-001 (160-40097-1) was analyzed for Isotopic Uranium (Alpha Spectrometry) in accordance with DOE. The samples were dried on 10/28/2020, prepared on 11/10/2020 and analyzed on 12/07/2020.

Manual Integrations and adjustments to Regions of Interest (ROI) were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report. HPPG-317364365-SU28A-B-001 (160-40097-1), (LCS 160-488775/2-A), (MB 160-488775/1-A), (160-40094-A-1-G) and (160-40094-A-1-J DU)

The method blank (MB) Z-score is within limits and is located in the level IV raw data. (MB 160-488775/1-A)

No analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample HPPG-317364365-SU28A-B-001 (160-40097-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 10/28/2020, prepared on 11/04/2020 and analyzed on 12/02/2020.

Many isotopes requested for analysis do not have any gamma emissions, or the gamma emissions they do have are very poor. Often, such analytes are reported by gamma spectrometry assuming secular equilibrium with a longer-lived parent. The client should ensure that such inference is acceptable for their sample based upon process knowledge. The following assumptions were made for this report:

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Job ID: 160-40097-1 (Continued)

Laboratory: Eurofins TestAmerica, St. Louis (Continued)

Inferred from	Reported to Analyte
Th-234	Pa-234
Th-234	U-238
Pb-210	Po-210
Pb-210	Bi-210
Cs-137	Ba-137m
Pb-212	Po-212
Xe-131m	Xe-131
Sb-125	Te-125m
Ag-108m	Ag-108
Rh-106	Ru-106
Pb-212	Th-228
Pb-212	Ra-224
U-235	Th-231
Ac-228	Th-232
Ac-228	Ra-228
Th-227	Ra-223
Th-227	Ac-227
Th-227	Bi-211
Th-227	Pb-211
Bi-214	Ra-226

The method blank (MB) z-score associated with Prep Batch 160-488209 is within limits and is stored in the level IV raw data. (MB 160-488209/1-A)

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline. HPPG-317364365-SU28A-B-001 (160-40097-1)

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



CHAIN OF CUSTODY

Ref. Document # 501197RSY-015

APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

Project Manager: Lisa Bercik
Phone #: (619)213-3389

Send Report to: Rose Condit
Phone/Fax Number: 415-987-0760
Address: 4005 Port Chicago Hwy

Sample Lead: Lewis, Devin

Sample Tech(s): Joaquin Ramirez

Project Number: 501197

Project Name: Hunters Point Naval Shipyard: Parcel G Remedial Action

Project Location: San Francisco, CA

Purchase Order #: 1159058

Shipment/Pickup Date: 10/23/2020

Waybill Number: 4957 0225 4373

Lab Destination: Test America (St. Louis Lab)
13715 Rider Trail North
Earth City, MO 63046

Lab Contact Name/ph #: Rhoeda Ridenbower (314)298-8566

Matrix	# of Containers	Preservatives (water)	Preservatives (soil)	Container Type	Analysis Requested							Evidence Bag ID	Comment
					Gamma Spec (EPA 901.1 M) - Full 21 day in growth gamma	Strontium-90 (EPA 905 MOD)	Re-226 by Alpha spec, Isotopic U (234, 235/6, 238)	Isotopic Pu (238, 239/240)	Dose Rate uR/Hr				
SO	1	16 oz. plastic jar	X	X	X	X	X	X	4	D1189472			

Special Instructions: **21 day ingrowth results only**
Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g

Turanaround Time: 3-day 10-Day 28-day Other Level of QC Required: I II III Project Specific

Method Codes C = Composite G = Grab Matrix Codes: DW = Drinking Water; So = Soil; GW = Ground Water; SL = Sludge; WW = Waste Water; CP = Chip Samples; A = Air; ABS = Asbestos; PO = Pipe Opening

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Locked Storage (RKillpack)		10/23/2020 17:13	Devin Lewis		10/23/2020 17:13
Devin Lewis		10/23/2020 17:26	SHIPPEDTOLAB		10/26/2020 08:38
Devin Lewis		10/23/2020 17:26	SHIPPEDTOLAB		10/23/20

*** Last 3 transfers shown above - Complete list of transfers on last page ***



All Transfers for COC 501197RSY-015

Relinquished By:	Relinquisher Signature:	Relinquish Date Time:	Received By:	Received Signature:	Receive Date Time:
Lewis, Devin	<i>[Signature]</i>	10/22/2020 17:43	Locked Storage (RKillpack)	<i>[Signature]</i>	10/22/2020 17:43
Locked Storage (RKillpack)	<i>[Signature]</i>	10/23/2020 17:13	Devin Lewis	<i>[Signature]</i>	10/23/2020 17:13
Devin Lewis	<i>[Signature]</i>	10/23/2020 17:26	SHIPPEDTOLAB	<i>[Signature]</i>	10/20/2020 08:30
Devin Lewis	<i>[Signature]</i>	10/23/2020 17:26	SHIPPEDTOLAB	<i>[Signature]</i> 10/23/20	



Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-40097-1

SDG Number: D1189472

Login Number: 40097

List Number: 1

Creator: Korrinhizer, Micha L

List Source: Eurofins TestAmerica, St. Louis

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Method Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
A-01-R	Isotopic Plutonium and Neptunium (Alpha Spectrometry)	DOE	TAL SL
A-01-R	Isotopic Uranium (Alpha Spectrometry)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
ExtChrom	Preparation, Extraction Chromatography Resin Actinide Separation	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = Eurofins TestAmerica, St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Lab Sample ID	Client Sample ID	Matrix	Collected	Received	Asset ID
160-40097-1	HPPG-317364365-SU28A-B-001	Solid	10/22/20 09:18	10/26/20 08:38	

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Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Client Sample ID: HPPG-317364365-SU28A-B-001

Lab Sample ID: 160-40097-1

Date Collected: 10/22/20 09:18

Matrix: Solid

Date Received: 10/26/20 08:38

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0477		0.0470	0.0471	0.160	0.0341	pCi/g	11/25/20 14:30	12/11/20 07:04	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	108		40 - 110					11/25/20 14:30	12/11/20 07:04	1

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Plutonium-238	-0.00576	U	0.0158	0.0158	0.100	0.0141	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.00576		0.00665	0.00667	0.100	0.00447	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Pu-242 (T)	93.0		30 - 110					11/10/20 16:55	12/07/20 15:19	1

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Uranium-234	0.369		0.0590	0.0666	0.250	0.00755	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.0314		0.0189	0.0191	0.100	0.00664	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-238	0.369		0.0588	0.0665	0.250	0.00754	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Uranium-232	76.2		30 - 110					11/10/20 17:08	12/07/20 15:14	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.427		0.161	0.167		0.189	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Actinium-227	0.163	U	0.418	0.419		0.337	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Bismuth-212	-0.0166	U	1.18	1.18		0.968	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Bismuth-214	0.553		0.150	0.160		0.0516	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Cesium-137	-0.0337	U	0.0874	0.0874	0.0700	0.0846	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Lead-210	-0.720	U	1.83	1.84		1.54	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Lead-212	0.388		0.101	0.109		0.0552	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Lead-214	0.550		0.129	0.140		0.0630	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Potassium-40	8.22		1.45	1.67		0.292	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Protactinium-231	0.000	U	1.01	1.01		2.55	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Protactinium-234	0.0768	U	0.233	0.233		0.268	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Radium-226	0.553		0.150	0.160	0.200	0.0516	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Radium-228	0.427		0.161	0.167		0.189	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Thallium-208	0.205		0.0667	0.0699		0.0224	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Thorium 228	0.388		0.101	0.109		0.0552	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Thorium-232	0.427		0.161	0.167		0.189	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Thorium-234	-0.421	U	1.05	1.05		0.879	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Uranium-235	-0.255	U	0.656	0.657		0.607	pCi/g	11/04/20 13:46	12/02/20 13:54	1
Uranium-238	-0.421	U	1.05	1.05		0.879	pCi/g	11/04/20 13:46	12/02/20 13:54	1

Eurofins TestAmerica, St. Louis

QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
 SDG: D1189472

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-490265/23-A
Matrix: Solid
Analysis Batch: 491588

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 490265

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Total Beta Strontium	-0.02016	U	0.0539	0.0539	0.160	0.0460	pCi/g	11/25/20 14:30	12/11/20 07:07	1
Carrier	MB	MB	Limits				Prepared		Analyzed	
Sr Carrier	%Yield	Qualifier	40 - 110				11/25/20 14:30		12/11/20 07:07	
	96.3								1	

Lab Sample ID: LCS 160-490265/1-A
Matrix: Solid
Analysis Batch: 491444

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 490265

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Total Beta Strontium	7.76	6.013		0.491	0.160	0.0470	pCi/g	77	75 - 125	
Carrier	LCS	LCS	Limits							
Sr Carrier	%Yield	Qualifier	40 - 110							
	109									

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Lab Sample ID: MB 160-488775/1-A
Matrix: Solid
Analysis Batch: 491105

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488775

Analyte	MB	MB	Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Uranium-234	0.0000	U	0.0152	0.0152	0.250	0.0125	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-235/236	0.002733	U	0.00947	0.00947	0.100	0.00636	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Uranium-238	-0.002192	U	0.0181	0.0181	0.250	0.0153	pCi/g	11/10/20 17:08	12/07/20 15:14	1
Tracer	MB	MB	Limits				Prepared		Analyzed	
Uranium-232	%Yield	Qualifier	30 - 110				11/10/20 17:08		12/07/20 15:14	
	81.2								1	

Lab Sample ID: LCS 160-488775/2-A
Matrix: Solid
Analysis Batch: 491106

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488775

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Uranium-234	3.18	3.300		0.328	0.250	0.0121	pCi/g	104	84 - 120	
Uranium-238	3.26	3.432		0.339	0.250	0.00541	pCi/g	105	82 - 122	
Tracer	LCS	LCS	Limits							
Uranium-232	%Yield	Qualifier	30 - 110							
	78.7									

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Lab Sample ID: MB 160-488774/1-A
Matrix: Solid
Analysis Batch: 491103

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488774

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Plutonium-238	0.005594	U	0.0194	0.0194	0.100	0.0150	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Plutonium-239/240	0.003733	U	0.00747	0.00747	0.100	0.00434	pCi/g	11/10/20 16:55	12/07/20 15:19	1
Tracer	MB %Yield	MB Qualifier	Limits		Prepared	Analyzed	Dil Fac			
Pu-242 (T)	92.5		30 - 110		11/10/20 16:55	12/07/20 15:19	1			

Lab Sample ID: LCS 160-488774/2-A
Matrix: Solid
Analysis Batch: 491099

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488774

Analyte	Spike Added	LCS Result	LCS Qual	Total	LOQ	DLC	Unit	%Rec	%Rec. Limits	
				Uncert. (2σ+/-)						
Plutonium-238	2.61	2.527		0.255	0.100	0.0205	pCi/g	97	80 - 125	
Plutonium-239/240	2.64	2.457		0.248	0.100	0.00633	pCi/g	93	81 - 125	
Tracer	LCS %Yield	LCS Qualifier	Limits							
Pu-242 (T)	97.3		30 - 110							

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-488209/1-A
Matrix: Solid
Analysis Batch: 490647

Client Sample ID: Method Blank
Prep Type: Total/NA
Prep Batch: 488209

Analyte	MB		Count	Total	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
	Result	Qualifier	Uncert. (2σ+/-)	Uncert. (2σ+/-)						
Actinium 228	0.02805	U	0.199	0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Actinium-227	0.01440	U	0.451	0.451		0.280	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Bismuth-212	0.0000	U	0.189	0.189		0.383	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Bismuth-214	0.01315	U	0.147	0.147		0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Cesium-137	-0.02984	U	0.0378	0.0379	0.0700	0.0533	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Lead-210	1.586		1.34	1.36		0.890	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Lead-212	0.009318	U	0.101	0.101		0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Lead-214	0.01598	U	0.107	0.107		0.0856	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Potassium-40	-0.1967	U	0.997	0.997		0.304	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Protactinium-231	0.0000	U	0.158	0.158		1.98	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Protactinium-234	0.01447	U	0.0320	0.0320		0.216	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Radium-226	0.01315	U	0.147	0.147	0.200	0.119	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Radium-228	0.02805	U	0.199	0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Thallium-208	-0.004688	U	0.00594	0.00596		0.0547	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Thorium 228	0.009318	U	0.101	0.101		0.0824	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Thorium-232	0.02805	U	0.199	0.199		0.106	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Thorium-234	-0.5789	U	0.465	0.470		0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Uranium-235	0.06692	U	0.212	0.212		0.348	pCi/g	11/04/20 13:46	12/02/20 13:51	1
Uranium-238	-0.5789	U	0.465	0.470		0.422	pCi/g	11/04/20 13:46	12/02/20 13:51	1

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QC Sample Results

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
 SDG: D1189472

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-488209/2-A
Matrix: Solid
Analysis Batch: 490648

Client Sample ID: Lab Control Sample
Prep Type: Total/NA
Prep Batch: 488209

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits	
Americium-241	96.4	98.24		10.3		0.585	pCi/g	102	87 - 116	
Cesium-137	26.7	26.94		2.91	0.0700	0.128	pCi/g	101	87 - 120	
Cobalt-60	9.50	9.522		1.03		0.0428	pCi/g	100	87 - 115	

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QC Association Summary

Client: Aptim Federal Services LLC
 Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
 SDG: D1189472

Rad

Leach Batch: 487040

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40097-1	HPPG-317364365-SU28A-B-001	Total/NA	Solid	Dry and Grind	

Prep Batch: 488209

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40097-1	HPPG-317364365-SU28A-B-001	Total/NA	Solid	Fill_Geo-21	487040
MB 160-488209/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-488209/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	

Prep Batch: 488774

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40097-1	HPPG-317364365-SU28A-B-001	Total/NA	Solid	ExtChrom	487040
MB 160-488774/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488774/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 488775

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40097-1	HPPG-317364365-SU28A-B-001	Total/NA	Solid	ExtChrom	487040
MB 160-488775/1-A	Method Blank	Total/NA	Solid	ExtChrom	
LCS 160-488775/2-A	Lab Control Sample	Total/NA	Solid	ExtChrom	

Prep Batch: 490265

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-40097-1	HPPG-317364365-SU28A-B-001	Total/NA	Solid	DPS-0	487040
MB 160-490265/23-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-490265/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: HPNS-Parcel G 501197

Job ID: 160-40097-1
SDG: D1189472

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Sr (40-110)	
160-40097-1	HPPG-317364365-SU28A-B-00	108	
LCS 160-490265/1-A	Lab Control Sample	109	
MB 160-490265/23-A	Method Blank	96.3	

Tracer/Carrier Legend
Sr = Sr Carrier

Method: A-01-R - Isotopic Plutonium and Neptunium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	Pu-242 (T) (30-110)	
160-40097-1	HPPG-317364365-SU28A-B-00	93.0	
LCS 160-488774/2-A	Lab Control Sample	97.3	
MB 160-488774/1-A	Method Blank	92.5	

Tracer/Carrier Legend
Pu-242 (T) = Pu-242 (T)

Method: A-01-R - Isotopic Uranium (Alpha Spectrometry)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)	
Lab Sample ID	Client Sample ID	U-232 (30-110)	
160-40097-1	HPPG-317364365-SU28A-B-00	76.2	
LCS 160-488775/2-A	Lab Control Sample	78.7	
MB 160-488775/1-A	Method Blank	81.2	

Tracer/Carrier Legend
U-232 = Uranium-232